

OCTOBER 1974

One-stop shopping

Modems and multiplexers

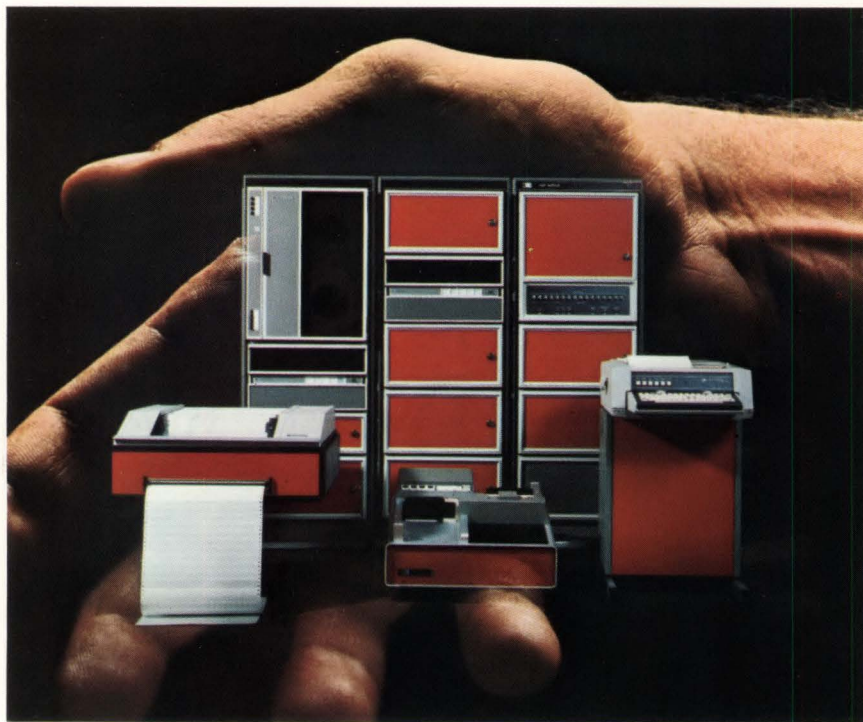
Outsmarting the competition

Computer Decisions

A HAYDEN PUBLICATION[®]



Marketing: orders or disorder



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INFORMATION RETRIEVAL NUMBER 91

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22416

DEPARTMENTS

- 2 Undercurrents**
Texas tubes: Disk Cobol from Datapoint
- 6 Newsdata**
Info 74 debut brings mixed reviews
- 10 Washington Datalink**
Rocky may chair privacy group
- 12 Runs for your money**
Have no fear, help is here
- 18 Letters**
Higher Q
- 50 Spotlight**
Enhanced 21MX series minis offer protection, storage to million words
- 54 Systems**
Multiuser business system built around PDP-11
- 55 Peripherals**
Floating point system speeds Nova Fortran IV
- 57 Data Communications**
Telex interface fits any terminal, line
- 58 Software**
Storage protection system

Cover: Marketing types are menu need to meet. Their course is what the issue is about.
Illustration by James Talarico.

Computer Decisions

FEATURES

- 22 Marketing: orders or disorder**
This month we've talked to the people who sell you computing equipment. Do you think you know how they think?
- 24 The small business system market**
Selling a small business system to the first-time user is not easy. Mixing equipment to meet the user's needs calls for a zippy recipe.
Douglas Baker
- 26 Outsmarting the competition**
The right measures of marketing and engineering talent have kept Sycor cooking in a very competitive marketplace.
Hesh Wiener
- 30 One-stop shopping**
Computer manufacturers and distributors who finance the gear they sell benefit from a very successful marketing concept—one-stop shopping.
Charles M. Spiridon
- 34 Marketing to the low volume user**
Many manufacturers of computer equipment have under-estimated the potential of the low volume user. But through care, planning and a well defined marketing strategy, a company can succeed in this market.
Ralph Gaboi
- 39 Modems and multiplexers**
If you're online you know how tough it is to select these items. Our survey should get you through.

INFORMATION SYSTEMS AUTOMATED PROCESSING PROBLEM SOLVING VOLUME 6 NUMBER 10 OCTOBER 1974

Publisher:
Don Huber
Editor:
Hesh Wiener
Senior Editor:
Larry Lettieri
Copy Editor:
Florence Lazar
Western Editor:
Bill Musgrave
Washington Editor:
Linda Flato
Correspondents:
Ivan Berenyi
Jan Snyders

Art Director:
James Talarico
Editorial Assistant:
Madeline Orsini
Sales Coordinator:
Julie Garrett
Adv. Production Mgr.
Dan Coakley
Circulation Mgr.
Barbara Freundlich
Promotion:
Walter G. Salm
Karen Kerrigan

Editorial Board:
Robert W. Bemer
Staff consultant,
Honeywell Information
Systems Inc.
Kenneth S. Kretschmer
President,
Kretschmer Associates
Theodor H. Nelson
President, The
Nelson Organization
Franklin K. Kuo
Professor of electrical
engineering,
University of Hawaii

COMPUTER DECISIONS is published monthly by Hayden Publishing Company, Inc., 50 Essex St., Rochelle Park, NJ 07662, (201) 843-0550. James S. Mulholland, Jr., President and Treasurer, and Peter T. Rado, Secretary. Printed at Brown Printing Co., Inc. at Waseca, MN and New York, N.Y. Copyright © 1974 Hayden Publishing Co., Inc. All rights reserved. Controlled circulation postage paid at Waseca, MN and New York, NY and postage pending at Rochelle Park, NJ. Subscription limited to persons with active, profes-

sional, functional responsibility in computer or computer user industry. Publisher reserves the right to reject non-qualified requests. No subscriptions accepted without complete qualifying information. Subscription rates: Qualified subscribers in the U.S., free; Canada, \$12.00; all other countries \$15.00 one year. Limited quota of subscriptions available for persons outside of field served as follows: U.S. and possessions and Canada, \$24.00 one year, \$48.00 three years; all other countries \$30.00 one year, \$60.00 three years. Single copies: \$3.00

UNDERCURRENTS

Texas tubes: Disk Cobol from Datapoint

The ante in the terminal business has been raised again, this time by San Antonio's Datapoint Corp. The firm has *Cobol*—disk *Cobol*, in fact—and is about to offer it on the model 5500. That terminal, their most powerful to date, will pace small mainframes according to insiders. Along with the stand-alone business capability, distributed users will be treated to SDLC hardware. The timing of *Cobol* release may spell trouble for Xerox, whose own terminal project, coded *Zodiac*, is said to be a competitive word processor, but not really up to stand-alone business processing.

Qantel, DEC with new disk systems

Qantel is moving hard into the distributed processing market with two disk-based systems. Supposedly, these machines will sell for 20 to 25 grand and talk to lots of different mainframes. The machines will be offered via a sales blitz aimed at filling the company's new Hayward, CA facilities with production people. Announcement is set for winter. . . DEC has been working on ways to move to larger end-user mini systems, and the PDP-11 group may have the answer: *DBMS*. The data base system, quietly developed on an 11/20 at Wheaton College in Illinois, will be commercially offered on larger processors so that 32 online users may be supported. Initial applications naturally include school administration software. Sources hint it's a direct challenge to HP's data base systems.

HP, DEC plans coincide on cpu upgrades

This business runs in cycles, and cpu announcements appear to be the current rage. Two major improved timesharing processors, one from Digital Equipment and the other from Hewlett-Packard are coming out within hours of each other. DEC's entry is a top-end PDP-10 type machine. (*Undercurrents*, April). HP's is the 3000C. Both products are expected to be accompanied by a flurry of software announcements.

More cheap tubes, SDLC hardware, new mini

Tec, Inc., of Tuscon, is almost ready to show its low-end terminal. Priced at a thousand dollars, more or less, the tube will be sold oem at first—but only at first. . . Periphonics Corp. has custom LSI circuits that handle SDLC communications. The tiny processor, already working, will enable the firm to continue its push into the front-end business. . . Dubbed "macro-programming," the incorporation of common subroutines into hardware at Varian has reached a new level. The firm will announce the first in a series of minis, a low-end processor with over 200 instructions and a new architecture. Not compatible with its existing minis, the series will eventually come with specialized end-user firm-ware packages plus writeable control store.

Xerox Computers: Undedicated to serving your university's needs.

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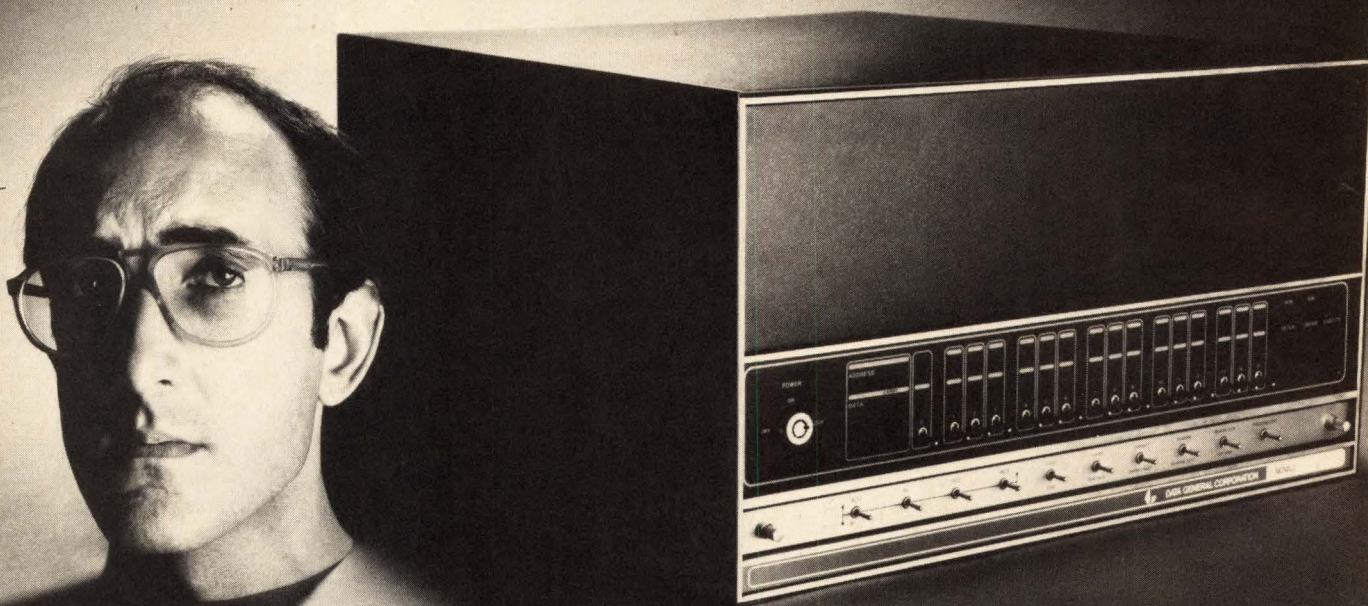
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INFORMATION RETRIEVAL NUMBER 5

NEWSDATA

Info 74 debut brings mixed reviews

Info 74, touted as the first large-scale conference and exposition for managers, made its debut last month in New York City. The four-day conference was sponsored by the American Management Association, which predicted a turnout of approximately 20,000. The actual attendance figure fell considerably short of that goal, reaching only 11,300.

Approximately 140 companies displayed their wares—soft and hard—to attract attendees, who were shuttling back and forth between the exhibits in the Coliseum and the “mini-sessions” at the nearby Americana Hotel. The exhibits, filling two floors, ranged from Data General’s plant-enshrined minicomputer shrine to MSI’s clever conglomeration of wheels, widgets and whirligigs ostensibly designed to promote the firm’s financial software systems. Live demonstrations of *The New York Times* data bank of news stories and Redactron’s word-processing systems drew substantial crowds.

Exhibitor response to the show was mixed. While some firms claimed they had made off-the-floor sales, others were less enthusiastic and reported that things had been very slow. Heavy session attendance of 2,300 cut sharply into exposition traffic totals and whittled away many exhibitors’ sales prospects. Despite the relatively low attendance figures, overall feedback on the show was generally favorable. Many vendors felt that Info, on its first time out, had done very well, and that, while it would not become a major threat to the AFIPS NCCs, it would gain considerable support in the industry.

The conference theme of “Who’s on Top—You or Your Information System?” was picked up by Peter G. Scotese, president of Spring Mills Inc., in his keynote address on “People and EDP: The Management Gap.” Despite growing familiarity with data processing and intensive efforts at educating management and users, Scotese maintained, companies are



Coliseum crowds

continuing to lose millions of dollars because of poor management of their edp systems. This management gap, he said, is a result of the “mystique of edp.” To remove this mystique, Scotese urged managers to “forget the flashing lights and the bafflegab jargon and the bewildering speed and be managers.”

Describing dp management as a “constant juggling act,” Scotese explained that data processing is a “high problem area.” Knowledgeable management, which separates fact from hyperbole, which is “geared to organization objectives and not to the glitter of a brightly colored package, can save literally millions of dollars by dealing carefully with suppliers,” Scotese emphasized. Although some progress has been made, he noted, there is still “plenty of room for improvement in the application of fundamental management principles to data processing operations.”

360 is back, and Leasco's got 'em

A combination of tight money, uncertainty over IBM’s plans for future systems, and increasingly attractive hardware packages tailored for individual customers by leasing companies is hitting European sales of IBM’s 370 mainframes, says Leasco Europa President David Woodward.

“There are many people all over Europe who would like to lease new 370s,” he says, “but interest rates are so high that neither they nor we can find adequate credit for new equipment. However, the other side

of that coin is that everyone is under budgetary pressure, and many people are looking to the computer department for savings.”

The result of this is, of course, that the leasing companies—Leasco Europa, with its large, \$100-million inventory of well-tried 360 machines first among them—are finding the prevailing economic climate not entirely to their disadvantage. “A lot of people are talking 360 again,” says Woodward, “and not just talking. Lately we have replaced seven 370s, on order or already installed, with 360 machines.”

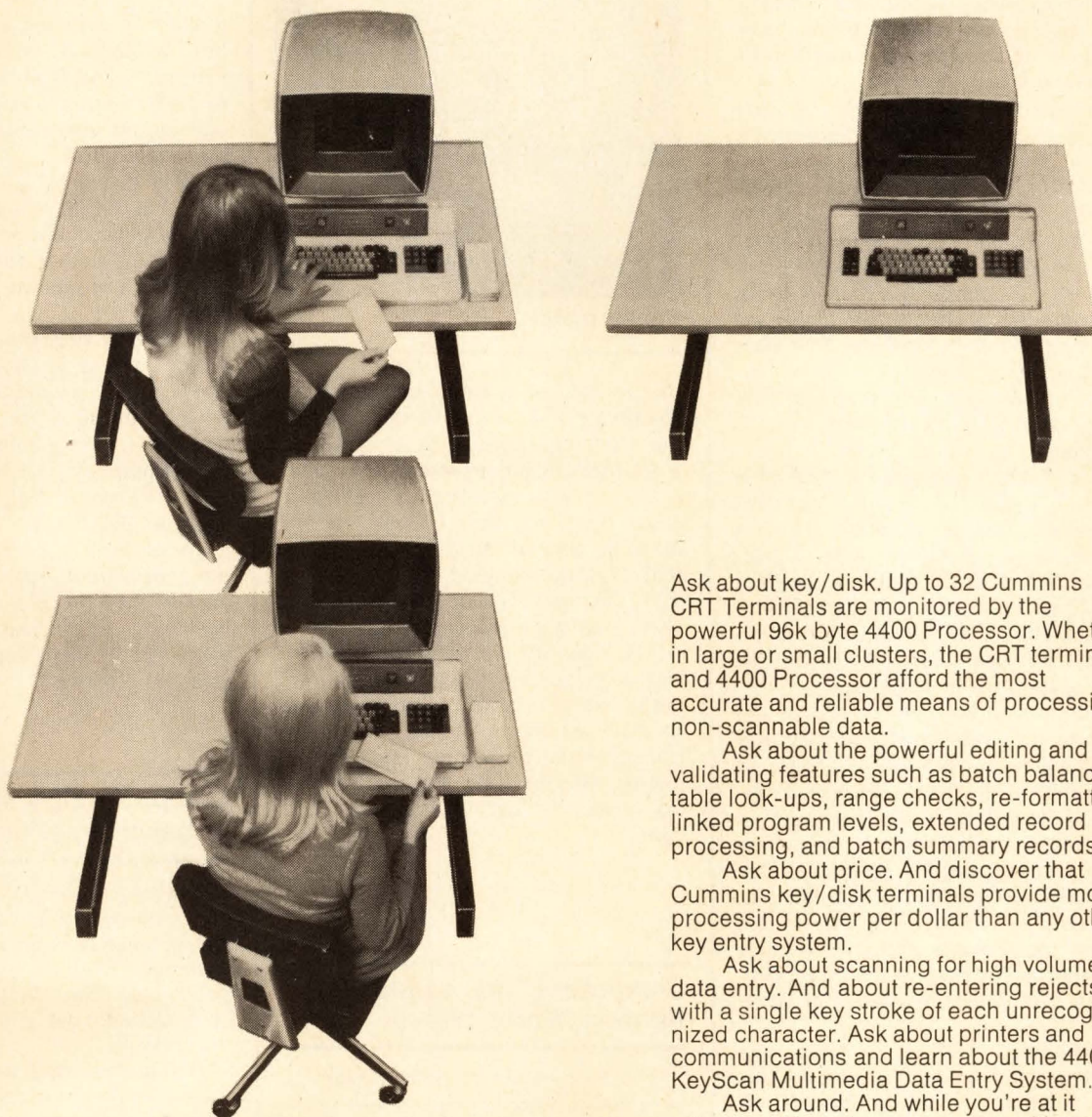
In the first six months of 1974, Leasco Europa re-marketed 27 of the 100-odd 360s in its inventory. According to Woodward, the current trends point to still better performance in the second half of the year. With the \$6.3-million worth of peripherals handled by Europa, the company’s half-year revenue is in the neighborhood of \$30-million. No wonder it has increased its UK marketing force by 25 percent and plans similar increases for its staffs in Germany and France.

Other trends are beginning to emerge. For example, leases are getting longer. Woodward says that 360 users are extending their leases in unprecedented numbers. “We have one customer who has extended his lease until mid-1981,” he marvels. Ironically, the company’s smaller group of 370 users is also following the trend.

Leasco is able to configure systems to customer specifications at its own engineering center in southern England, rather than relying on the IBM service, which has proved unacceptably slow in the past. This has led to the popularity of a combination of 360/65 mainframes coupled with plug-compatible 3330-equivalent disk units supplied by independent manufacturers. This is an option that IBM does not make available. “We have put in five 65s with non-IBM 3330s on them,” says Woodward. “This combination is really catching on.”

continues on page eight . . .

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INFORMATION RETRIEVAL NUMBER 7

OCTOBER 1974

7

NEWSDATA...

... from page six

Read a poem, play chess with Community Memory

A woman walked in from a San Francisco street, sat down at a terminal, took a few minutes to read two hand-lettered pages of instructions. Then she typed FIND VW REPAIR.

Several seconds later the message 3 ITEMS FOUND popped up on the screen. The woman typed PRINT ALL, but due to the small size of the screen, the first item rolled off the top of the tube before she could write it down. After copying what she wanted from the last two items, she took a quick look at the instructions. Then she keyed in PRINT 1, and the first item returned to the screen.

Before she left she typed THANK YOU; the machine blinked NOT A COMMAND.

The machine she used is part of a program called Community Memory, and the setting is informal: The crt sits on a wooden box, with a telephone and coupler visible through a hole. The keyboard is cluttered with little plastic labels that draw attention to special characters, such as the back-space and carriage return.

Community Memory is one of the projects in an XDS-940 run by Resource One, a nonprofit group of computer professionals in San Francisco. The program has been out in the field for more than a year. Several terminals within Resource One are tied into Community Memory, including one in the Mission branch of the San Francisco Public Library and another in a store near the University of California campus in Berkeley.

Community Memory is more than a computerized want-ad section; it's been compared to a community bulletin board that reaches farther than the traditional community. Aside from offers to buy and sell, the system contains public service announcements, poetry, an on-going chess game between two players who don't trust the mails. In short, it contains anything that anyone wants to put into it.

On an average day, about 20 new items are entered into Community Memory, but statistics are not available to determine how many inquiries are made each day. The data base itself contains about 2,100 items.

Handy machine halts student handouts

There soon may be some hungry students on college campuses where the Identimat has matriculated. A student will no longer be able to lend his meal plan card to a friend or use last year's card. On the other hand, if he loses his pass or if it's stolen, he won't have to pay for someone else's free meals.

This new dining hall guardian is



Palma mater

the product of Identimation Corp. of Northvale, NJ. In less than a second, the machine measures and compares a student's hand geometry characteristics with the data on his meal plan card. If it matches, he eats. If the machine says it's the wrong hand, or that he's not entitled to lunches, or that the pass is last term's or last year's, he goes hungry.

The identity verification machine was originally developed for high security access control for computer rooms, munitions stores, plant entrances. Used on campus, says Identimation, the machine will quickly pay for itself through savings in food costs.

Computers, not cannons, fighting World War III

The first battles of World War III have already been fought—with computers rather than cannons, according to Dr. Ruth M. Davis, director of the National Bureau of Standards' Institute for Computer Sciences and Technology.

Discussing "Computers and the International Balance of Power" in a recent address to the Congress of the International Federation of Information Processing Societies in Stockholm, Dr. Davis said:

"World War I was fought with chemistry. World War II was fought with physics. World War III is being fought with computer science. The

first battles of World War III may well have occurred when mathematical formulations of strategies and counter-strategies of realistic proportions were able to be tried out as war games on computers.

"With realistic wars fought in 20 minutes or 20 hours on computers, decisions to engage in such encounters have been nil. No statistical correlations are needed to validate the fact that no major encounters have occurred between large computer-processing nations."

Davis pointed out that man has attempted to use the computer to help him understand himself, to help him gain more intelligence and power and to replace himself in performing tasks demanding intelligence and the capability to control.

"It is this varying and contradictory role that we have ourselves assigned to computers that results in a great deal of the honest confusion, mistrust and fear surrounding computers," she said.

"There is presently no balance between man and computer that possesses any permanence. The changing balance reflects the changing roles man is assigning both to himself and to computers."

She warned, "Until the day comes when science finds a way of installing a conscience in every computer, we must develop human, personal safeguards that prevent computers from becoming huge, mechanical, impersonal robots that deprive us of our essential liberties."

Computer tips scale in balance service boom

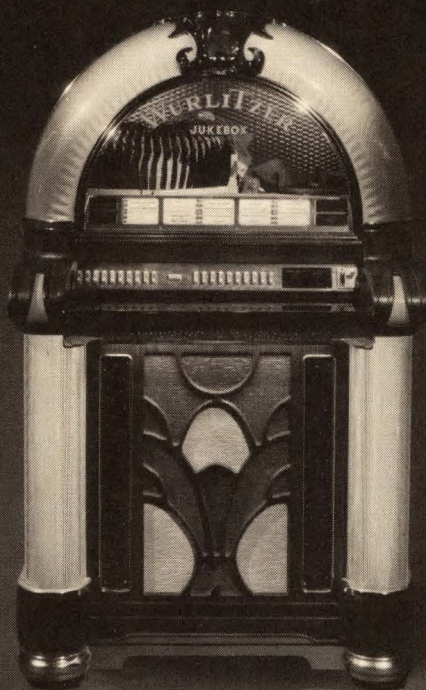
If there are 150,000 potential annual service customers, and an average maintenance charge is \$32, does it multiply out to big business? You don't need New Math, much less a computer, to get a dollar answer in the millions.

But if you want to reach that potential market you need either a huge staff or a computer. Mettler Instrument Corp., of Princeton, NJ, leading manufacturer of precision weighing equipment, chose the NCR Century 200, and has built service into a handsome annual business.

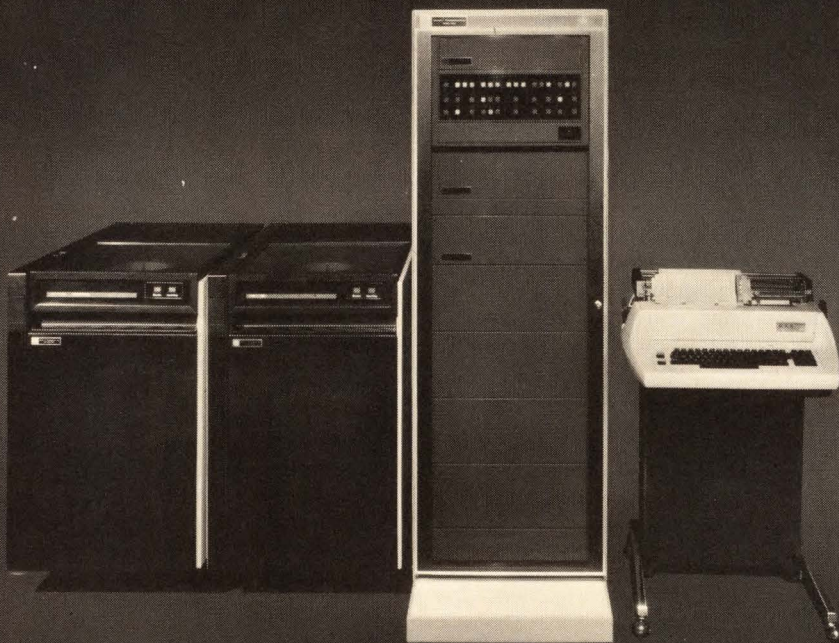
Basis of the balance-builder's business boom is the personalized service notification letter. Stored in the computer's files are the complete histories of all units purchased since

continues on page fifty nine . . .

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60 MINUTES~ONE DIME



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WASHINGTON DATALINK

by Linda Flato

ROCKY MAY CHAIR PRIVACY GROUP

Nelson Rockefeller, in his long and varied political career, has charmed his way onto various influential committees. If he is confirmed as President Ford's team-mate, Rocky will again make the committee scene as reigning head of the Domestic Council Committee on the Right of Privacy. The committee, established last February, was chaired by Ford when he was Vice President. Douglas Metz, former deputy executive director, will move into the number two slot as acting executive director.

The fourteen privacy proposals issued by the committee in July never reached former President Nixon's desk. They have since been turned over to Ford, who is expected to endorse them sometime this fall. An enthusiastic privacy advocate, Ford has promised "hot pursuit of tough laws to prevent illegal invasion of privacy in both government and private activities."

On the congressional front, a Republican contingent of privacy supporters released a report calling for legislation to remedy a situation in which "the individual has been physically bypassed in the modern information process." The group, headed by Rep. Barry Goldwater, Jr. (R-CA), condemned the government's information-gathering practices, which have made the right to privacy "subservient to concerns for expediency, utility and pragmatism."

The group endorsed various recommendations prohibiting the use of the Social Security number for identification purposes. They urged Congress to support legislation to curb the development and use of any type of standard universal identifier until "the technical state of the computer can ensure the security of such a system."

Other proposals focused on safeguarding the collection and dissemination of financial and consumer information and sensitive records dealing with juveniles, arrests and medical files. In order to protect personal privacy from abuses brought about by computerization, the group strongly opposed creation of a centralized federal data bank, and suggested that a privacy protection agency be set up to enforce any proposed legislation.

IBM SATELLITE PLAN OPPOSED

IBM's domestic communications satellite venture with Communications Satellite Corp. may never get off the ground if Western Union Corp. has anything to say about it. Western Union, fearing tough competition for its own Westar satellite system, has charged that the IBM-Comsat combo "raises antitrust and other policy issues of far-reaching scope." The company warned the Federal Communications Commission that the powerful duo may "forge an impenetrable barrier to any successful market entry by other companies."

Under the IBM-Comsat pact, IBM and Comsat's Comsat General subsidiary would buy a one-third interest in CML Satellite Corp. from Lockheed Aircraft Corp. and MCI Communications Corp. The purchase price would total \$5 million, of which IBM would shell out \$1.6 million, and Comsat General around \$900,000. The cozy arrangement would result in IBM owning about 55 percent of

CML, and Comsat General holding a 45 percent stake. If the deal goes through, the first IBM-Comsat satellite system should be flying high by the end of the '70s.

MOSS HITS VA'S TARGET

Rep. John E. Moss (D-CA) has launched an all-out attack on the Veterans Administration's proposed \$50 million Target computer system. Moss, a strong privacy advocate and ringleader of the recent fight to dump FEDNET, charged that the system was an "obvious and ominous" threat to personal privacy. He warned that the new VA system would involve "almost total internal computerization of VA's records, claims and its millions of annual veteran contacts." In a detailed, three-page letter sent to President Ford, Moss claimed that the VA had been "exchanging personal data on veterans with other agencies for some time." He urged the President to begin "an immediate probe" of the VA's "unauthorized data network."

Responding to the Moss allegations, Jerry F. terHorst, then White House press secretary, said that President Ford was "very interested" in the VA's Target system. He added that the Domestic Council Committee on the Right of Privacy would keep an eye on Target to "make sure that it will in no way invade the privacy of any individual, whether they are veterans or nonveterans. It will not be used for that purpose—if it remains."

PATENT COMPUTERIZING FAR OFF

Computerization of the Patent Office's voluminous files of patents and publications "is still many years from reality," according to patent commissioner C. Marshall Dann. In a recent address before an American Bar Association meeting in sunny Honolulu, Dann recounted the office's disastrous experiment with computers in 1971. Called Project Potomac, the EDP boondoggle involved the use of computers in searching and classifying patents. The project was scuttled in 1972, after the PO found out that its ultra-computerized system would leave a \$40-million hole in its budget.

Dann explained that the Patent Office was willing to cooperate in the development of computerized searching systems—but not systems as comprehensive and costly as the Potomac lemon.

AFIPS STUDIES ADVISORY PLAN

The government may get some help with its computing problems from the American Federation of Information Processing Societies (AFIPS). The association has formed a Washington Activities Study committee to investigate the possibility of setting up a federal EDP advisory office in the nation's capital. The office would provide the government with technical assistance on computer-related issues and would keep the federal bureaucracy up-to-date on research and development in the field. The study committee is headed by former football jock Frank B. Ryan, who is the current director of the House information staff for the Committee on House Administration.

Why sell only data processing services when you could sell a complete turnkey system?



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And what's probably most important to you and your customers: the cost of a typical System III can be substantially less than the cost of competing systems.

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INFORMATION RETRIEVAL NUMBER 11

RUNS FOR YOUR MONEY

by Jan Snyders

Have no fear, help is here.

SOS. . . SOS. . . SOS. . .

No, this is not a call for help; rather, we are saying that help is here for you if these are your problems: How can I save core? How can I save time? How can I help programmers?

Our answer to these questions is sos: Solution Oriented Software.

For instance, Cutler-Williams Inc. of Dallas has a package called the *Executor*. Under *OS/MVT/HASP* it tackles increased throughput, resource allocations and core utilization, while remaining release-independent and transparent to the user.

The *Executor* is designed to process job steps as fast as possible by utilizing every last bit of potential that the machine has. For jobs run by the *Executor*, you will probably see no change in the amount of CPU time accounted to each job step, nor will you see any change in the real execution time (measured from step ATTACH to step END). However, you will see significant reduction in the total real job time, which is measured from job start to job termination. The *Executor* achieves its throughput increase by eliminating the scheduling overhead present in step transition.

One of the important features of the *Executor* is that it is user-transparent. The only thing that the programmer will notice is that the job will be processed 30 to 80 percent faster than before.

The operator will find a new group of messages coming out on the console which provide information about jobs being processed by the *Executor*. The new messages are similar to the standard *OS* messages except that there are *Executor* prefixes on them for the purpose of identification. In other words, the *Executor* runs concurrently in the same machine with the *OS* job scheduler but does not replace it. The *Executor* is designed to run a major portion of an installation's jobstream.

When the *Executor* encounters a job it cannot process, it returns the job to *HASP* so that it may be run by an *OS Initiator*. This way no job will be incorrectly run. The *Executor* makes this determination as soon as it has scanned the *JCL*, so the entire process is quite brief.

The *Executor* runs on the IBM System/360 and 370. The larger the CPU, the more the *Executor* helps. Under *MVT*, the *Executor* requires a dedicated region of 16k, plus 1k for each concurrent *Executor*, and a 6k module in the *LINK-PACK* area. Under *MVT*, the *Executor* requires less system queue space than an *Initiator*. The *Executor* uses a small number of records in the *SYS1, SYSJOBQU* data set, and a limited amount of direct access space for a work data set pool. The size of the pool may be controlled by the installation.

Another method of saving core and time is by proper scheduling. A well-planned scheduling system enabled one company I investigated to delay delivery on a new computer for ten months, take another off the air completely and triple throughput on a third.

The scheduler, available from Value Computing Inc., Cherry Hill, NJ, is the *Computer Scheduling and Control System (CS)*². The system is a set of five batch-oriented programs: job accounting, billing, single/multiple machine scheduling, and tape library monitor. The first four programs are generally complementary, while the tape library system is basically independent. The package gets the most out of a system by providing information that will allow users to schedule jobs intelligently.

The principle module of *(CS)*² is the job scheduler, *System III*. This module uses the data contained in a Workload Control File produced by *System I*. *System III* applies a series of algorithms to produce a coordinated schedule that allows an appropriate mix of I/O- and CPU-bound jobs. This schedule also shows which jobs should be run in which partition or region and at what time.

There are three major subsystems in the *System III* scheduler: The *Sched* program, the *Maint* program and the *Sched 31* program. The *Sched* program accepts user-specified scheduling parameters, activates the scheduling algorithm, and produces the schedule with beginning and end times for each job, plus main memory locations for individual programs. The *Maint* program allows the user to add, modify or delete program profiles in the Workload Control File. The long-range scheduling program, called *Sched 31*, can

forecast a month's upcoming workload, although not in as great detail as for the daily run.

System I, the backbone of the (CS)² programs, is a job accounting system that interfaces with the time accounting or log data captured by IBM's *System Monitor Facility* for OS or VS, or the *Job Accounting Interface (JAI)* in DOS or DOS/VS. The job costing system, *System II*, is ordinarily run at the same time as the end-of-month *System I* job. The *Multiple Machine Scheduler* can schedule a composite workload for as many as 15 computer systems. Each job is slated for a primary or preferred machine, but it can be run on up to four secondary or alternate systems.

The final component of the system is the *Tape Library Monitor System*. This module is independent and handles the administrative functions of maintaining the library, including inventory reports and other operational record-keeping.

Using this system the chaos will not end overnight, but without techniques and systems it may never end.

No article on SOS would be complete without some mention of *Grasp* from Software Design, Inc., Burlingame, CA. *Grasp* can automatically spool card input, card output or printed output on a local device or a terminal such as the IBM 2780, IBM 2770, System/3 or 360 model 20. It uses a spooling technique fundamentally different in concept from conventional systems.

The latter usually operate on the principle of reading card input for a later job, or issuing printed output for an earlier one, in parallel with the current job. This approach invariably results in an increase in job turn-around time; sometimes the printer is idle even though the current job is issuing results for subsequent printing.

For the sake of simplicity, consider a version of *Grasp* set up for the printer spooling. *Grasp* continuously monitors the I/O requests issued by the user's program, and gathers into one of several core buffers the print lines issued by the program. When the buffer is full, it determines whether or not the printer is available to receive this output. If it is free, printing from the core buffer begins immediately. If it is busy, and no more core buffers are available, the buffer-load is written away to disk. Conversely a previously written block may be retrieved from the disk in order to maintain the flow of printed information at full printer speed.

At one end of the scale, therefore, a program that is producing lines of print at less than maximum printer speed will not have to write any blocked lines to disk. At the other end of the scale, where the printer is already busy with printing from a previous program or with earlier results of the current program, *Grasp* writes away to disk the blocked-up print lines.

The disk print stream is continuously depleted at its earlier end as actual printing occurs and is continuously extended at its later end as the current program's print output is produced. Similarly, if the printer is free at the start of a fast printing program, it will be usual for printing to occur for a brief initial period solely through core buffering.

This package, like the others, is transparent to the user and designed to save time. At present, when there seems to be a shortage of everything worthwhile, it is good to know that there is help at last for the shortage of time and core storage.

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INFORMATION RETRIEVAL NUMBER 13

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digital



INSIDE STORY

Microcomputers mature

Microcomputers, small computer-on-a-chip circuits that have been in production for less than three years, are beginning to have an impact on the computer industry. Although they are not yet in widespread use in general-purpose computers, they are already starting to emerge in applications such as programmable controllers and data terminals that require inexpensive decentralized computing power.

When microcomputers made their commercial debut in 1972, most minicomputer manufacturers ignored them. But swift acceptance by a host of users and the appearance of more competitive and more powerful versions—such as the Intel 8080 and the Series 3000 Bipolar microprocessors—have forced mini makers to reconsider their views. One of the first of the big mini makers to realize the potential of microprocessors was Digital Equipment Corp., which last March introduced a set of microcomputer building blocks based on the Intel chips and a minicomputer-on-a-board called the PDP-8A.

The influence of the microprocessor on a slew of computer industry products is expected to increase significantly and rapidly. According to a recent study by Gnostic Concepts, a market research outfit located in Menlo Park, CA., microprocessors will become widely used in the United States during the next decade. The market for these devices, they say, will increase from slightly less than \$10 million in 1974 to \$107 million in 1982.

Applications for microprocessors run the gamut from computer terminals to industrial process controllers and from air traffic control systems to small accounting systems. In some cases microprocessors have even replaced small dedicated minis. But no micro makers are pushing the computer-on-a-chip as a replacement for the minicomputer, especially the general purpose one.

There are several reasons for this. First, no manufacturer of these large-scale integrated devices can compete with the mini makers when it comes to software support. Second, the MOS microprocessors operate at speeds that are about an order of magnitude slower than a minicomputer with bipolar circuits.

Bipolar set introduced

But with the introduction last month of Intel's Series 3000 Bipolar Microprocessor Set, this picture can change somewhat. This new microcomputer features an instruction cycle time of 70 nanoseconds and a system cycle time of between 120 and 300 nanoseconds, depending on which configuration is used. The high speed of the bipolar machine is achieved through the use of Schottky-TTL technology.

The heart of the new bipolar set is the 3002 central processing element which is a complete two-bit slice processor. Each CPE consists of 11 general purpose registers, an accumulator, bit masking logic and main memory housekeeping logic.

An interesting feature about the 3000 microcomputer set is that by using minimal additional circuitry (a look-ahead carry generator with a D flip-flop), "pipelining"—a method of overlapping microinstruction fetch and execution times—can be implemented. The pipelining results in a reduction in the cycle time to 120 nanoseconds.

Even with this greatly improved microprocessor chip set, the IC manufacturers are still not expected to push the chips as replacements for minis because that would mean competing with some of their biggest customers. However, the new chips set is so powerful and (relatively) inexpensive, that its availability will make it easy for a lot of small companies to come out with fast, powerful and inexpensive minis.

This could have a dramatic effect on the whole minicomputer business because it will create a lot of competition for companies such as Computer Automation and General Automation who have spent a lot of money developing proprietary microprocessor chips.

In addition to impacting mini makers, the new bipolar set could also seriously affect existing microprocessors, particularly the GPC/P micro from National Semiconductor. Like the new Intel set, this processor is a slice oriented, microprogrammable machine. Unlike the Intel set, it is made with MOS technology, and therein lies the only hope for its survival. MOS parts are generally less expensive than bipolar parts and if National can get the price down low

Microprocessor scorecard

MICROPROCESSOR SCORECARD	CLASSIFICATION	TECHNOLOGY	PARTS FAMILY										FEATURES										NUMBER OF CPU REGISTERS	RETURN STACK SIZE (Nr. x Bits)	PRICE RANGE (approx. 100-400 CPU)	STATUS	REMARKS
			Clock Driver	I/O Interface	UART/USART	RAM	ROM/PROM	Interface	Interrupts	On-Chip CPU	Microprogrammed	Accessible Stack	DMA Ability	BCD Arithmetic	WORD SIZE (Data/Instructions)	ADDRESS CAPACITY (Program Words)	REGISTER (Lanes per Data Word)	ALU	XR	GP							
BURROUGHS MINI-D	8-Bit CPU	PMOS						✓					8/12	256	9	3		1	1 x 8		\$ 60	2073	3073	ROM on CPU			
ELECTRONIC ARRAYS	8-Bit CPU	NMOS	✓		✓	✓	✓	✓	✓	✓	✓	✓	8/8	64K		1	1	15	7 x 16			3075			16-Byte String Operations		
FAIRCHILD F-8	8-Bit CPU	NMOS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	8/8	64K	2	65			(RAM)		\$ 75	4074	1075			Clock on Chip	
FAIRCHILD PP5-25	4-Bit CPU	PMOS		✓		✓	✓						4 x 25/12	6656	62.5	1			4 x 12		\$ 60		2071				
INTEL 4004	4-Bit CPU	PMOS	✓	✓		✓	✓	✓	✓			✓	4/8	4K	10.8	1		16	3 x 12		\$ 30	2071	4071				
INTEL 4040	4-Bit CPU	PMOS	✓	✓		✓	✓	✓	✓			✓	4/8	4K	10.8	1		24	7 x 12		\$ 40	4074	4074			8K Program Space in Two Banks	
INTEL 8008-1	8-Bit CPU	PMOS	✓	✓	✓	✓	✓	✓	✓				8/8	16K	12.5	1		6	7 x 14		\$ 60	4071	1072			Second Source: MIL	
INTEL 8080	8-Bit CPU	NMOS	✓	✓	✓	✓	✓	✓	✓			✓	8/8	64K	2	1		8	(RAM)		\$ 200	4073	2074				
INTEL 3001	2-Bit Slice	Bipolar				✓	✓	✓	✓	✓	✓	✓	2N/18+	512	16.5	2		10	(NONE)		\$ 550	3074	3074				
INTERCIL 6100	12-Bit CPU	CMOS	✓			✓			✓	✓			12/12	4K	5	1		1	Modifies Program		\$ 175	4074	1075			PDP-8 Code; Clock on Chip	
MONOLITHIC MEMORIES 6701	4-Bit RALU	Bipolar										✓	4/17		2	3		16	(NONE)		\$ 95	1074	2074				
MOSTEK 5065	8-Bit CPU	PMOS						✓	✓		✓	✓	8/8	32K	10	3			(RAM)		\$ 100	1074	3074			3-State CPU	
MOTOROLA 6800	8-Bit CPU	NMOS		✓	✓	✓	✓	✓	✓		✓	✓	8/8	64K	2	2	1		(RAM)		\$ 150	2074	4074			Second Source: AMI	
NATIONAL CMP-8	8-Bit CPU	NMOS		✓	✓	✓	✓	✓	✓		✓	✓	8/8	64K	1.6	2	2		(RAM)			1075	2075				
NATIONAL GPC/P	4-Bit Slice	PMOS									✓	✓	4N/23	100	14	8		16 x 4N		\$ 150	1073	3073			1 ≤ N ≤ 6		
NATIONAL IMP-4	4-Bit CPU	PMOS					✓	✓		✓		✓	4/4	4096	12	4		7 x 12		\$ 150	3074	4074			16 x 4 Data Stack		
NATIONAL IMP-8	8-Bit CPU	PMOS					✓		✓	✓	✓		8/8	64K	4.6	3	1	16 x 8		\$ 230	4073	1074					
NATIONAL IMP-16	16-Bit CPU	PMOS					✓		✓	✓	✓		16/16	64K	4.6	2	2	16 x 16		\$ 310	1073	3073					
RAYTHEON RP-16	4-Bit Slice	Bipolar					✓		✓				4N/48	64K	1	1	1	2	(RAM)			4074					
RCA COSMAC	8-Bit CPU	CMOS						✓	✓		✓	✓	8/8	64K	6	1		p x 16		\$ 300	4074	2075			(p+2r) ≤ 30		
ROCKWELL PP5-4	4-Bit CPU	PMOS	✓	✓	✓	✓	✓		✓		✓	✓	4/8	4K	5	1		1	2 x 12		\$ 45	1072	3072			8K Program Space in Two Banks	
ROCKWELL PP5-8	8-Bit CPU	PMOS	✓	✓	✓	✓	✓		✓	✓	✓	✓	8/8	16K	4	1	1	2	(RAM)		\$ 47	4074	1075				
SIGNETICS 2650	8-Bit CPU	NMOS					✓	✓				✓	8/8	32K	4.8	7		8 x 15		\$ 120	4074	1075					
TOSHIBA TLCS-12	12-Bit CPU	NMOS		✓		✓	✓		✓	✓	✓		12/12	4K	13	4		6	(RAM)		\$ 215	2074	3074				
TRANSITRON TMC/1601	4-Bit Slice	Bipolar						✓		✓	✓	✓	16/16	32K	4	u	v		(RAM)			2075	3075			(u+v) ≤ 8	

enough, the GPC/P may hang in there.

Microcomputer variety is large

Quite a few microprocessor products are now commercially available. According to a survey taken by Jerry Ogden of Microcomputer Technique, Reston, VA., there are currently 25 microprocessor chip and chip sets being developed or already in production. The most common technology used is p-channel MOS. Twelve of the 25 microprocessors listed use PMOS. This technology has speed limitations, however, so many manufacturers are looking to n-channel MOS and bipolar technologies to overcome this problem. Seven of the current devices use NMOS while only four use bipolar. For applications that require extremely low power, two manufacturers are developing CMOS units.

Standard LSI-processor products in various configurations handle data in four, eight and 16-bit word lengths, and modular multichip microprocessors can be used to achieve even longer word-length processing.

The available configurations with their major features consist of the following:

- Microprocessor chip sets, including special interface ICs and sometimes special memories, to simplify designs of minimum hardware systems.
- Microprocessor-based logic boards to eliminate the need to test and interconnect processor chips, peripheral circuits and memory.
- General purpose microcomputers on cards or in boxes, to permit system design development and testing.
- Microprocessor-based minis offering maximum flexibility and capability when compared with microcomputer chips.

The cost of each configuration increases with the unit's complexity, and so does the software support. For the user, however, better instruction sets mean shorter programs to accomplish any particular task. In production, the savings on memory offset initial costs. Thus there are markets for microcomputers of every power class.

—JHG

Letters

Higher Q

Sir: Congratulations on your excellent survey article on printers that appeared in your July, 1974 issue. We very much appreciate the fact that Qume, a fledgling company with new products, was even included in your survey. There is a point that bothers me a little bit though, and I am wondering if there is anything you can do to help us correct the problem. The Qume Q45 printed was shown as having 30 cps printing speed, the same as the Q30. The key point in the Q45, the one factor that makes it different from any other daisy wheel or high speed character printer is the fact that it is 45 cps printing speed.

Otherwise, of course, in looking at the specifications you have presented, there is no way to justify the \$275 differential.

Avery F. Blake, Jr.

Vice President-Marketing
Qume
2323 Industrial Parkway
Hayward, CA 94545

Secure at last

Sir: In your June issue you have an item, "Security Audit Kit," which refers readers to Firebrand, Krauss & Co.

We have sold publishing rights to American Management Association, 135 West 50th St., N. Y., N.Y. 10020. AMA now publishes the security audit which is known as SAFE.

L. I. Krauss

Firebrand, Krauss & Co., Inc.
E. Brunswick, NJ.

Verbs and spices

Sir: Stanley R. Zegel, whose letter appeared in the August 1974 issue of your magazine complaining about your sentence, "... systems were architected like the one above," evidently hasn't heard about the person—supposedly an IBMer but it could have been anybody—who formulated the following rule:

"There is no word in the English language that can't be verbed."

Wallace B. Riley

Tarrytown, NY

Late flesh

Sir: Your May editorial appeared just a bit too late for those who had already made plans for their exhibits at the National Computer Convention in Chicago. I found the exhibit room at the convention less than attractive, with all the 'female flesh' walking around, and the lack of female persons selling equipment.

As I went around pricing memories for our mini, I tried to ask women at the exhibits questions concerning the exhibit, if they were reasonably dressed and (as was usually the case) not very busy. Invariably, I was referred to a man to have my questions answered.

It seemed that there were so many women around for adornment, so few that knew anything about memories, or terminals, or other items I have just bought or am about to help purchase. I did meet a few women who knew something about their small areas, like how to program a HP65 or how the Beehive terminal could be used in library work. The woman at the ACM booth certainly knew what she was talking about.

But very few vendors thought that I knew what I was talking about. It was difficult to get a salesman to talk seriously about memory or terminals to me. A friend of mine toured the exhibits with a man, to help attract salesmen's attention. But then the salesmen would speak to the man in answer to her questions! The decision about which terminal to purchase is completely hers, but no vendor would assume that she was the person to speak with.

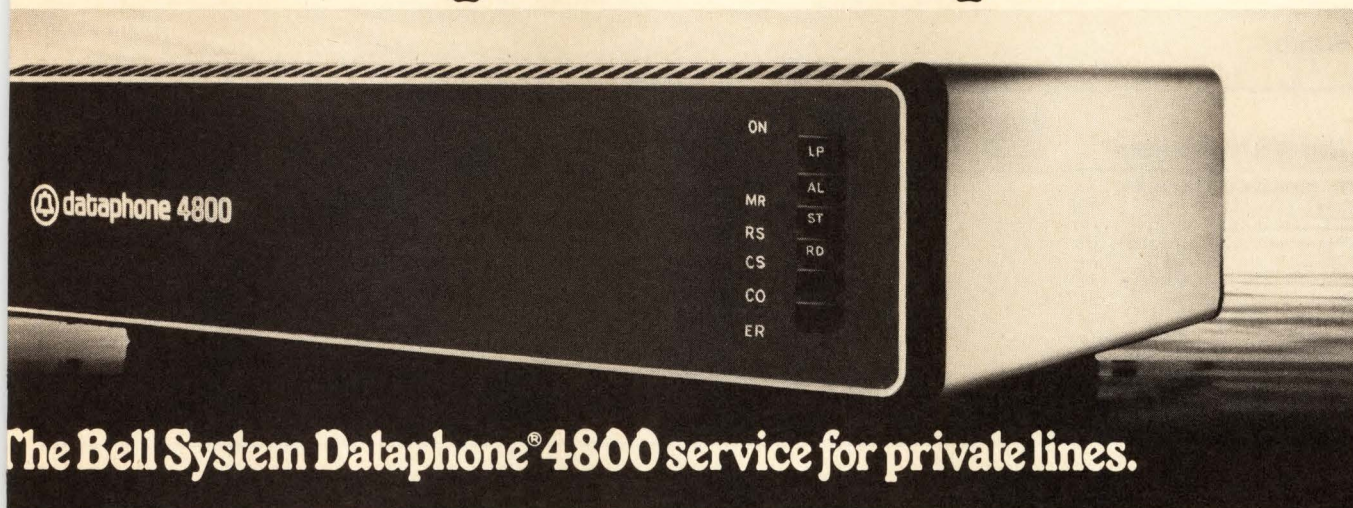
Most annoying to me, at the exhibits, however, was not the attitude of the vendors, which changed immediately when they discovered that I was seriously looking for memory and had just purchased a terminal. The thing that really annoyed me was the high concentration of absurdly dressed women, with no function at all except what some considered adornment. Personally, I was repelled by exhibits featuring such displays. You were so right when you said that this practice may soon cost a sale, if it hasn't already. . .

Mary Poppendieck

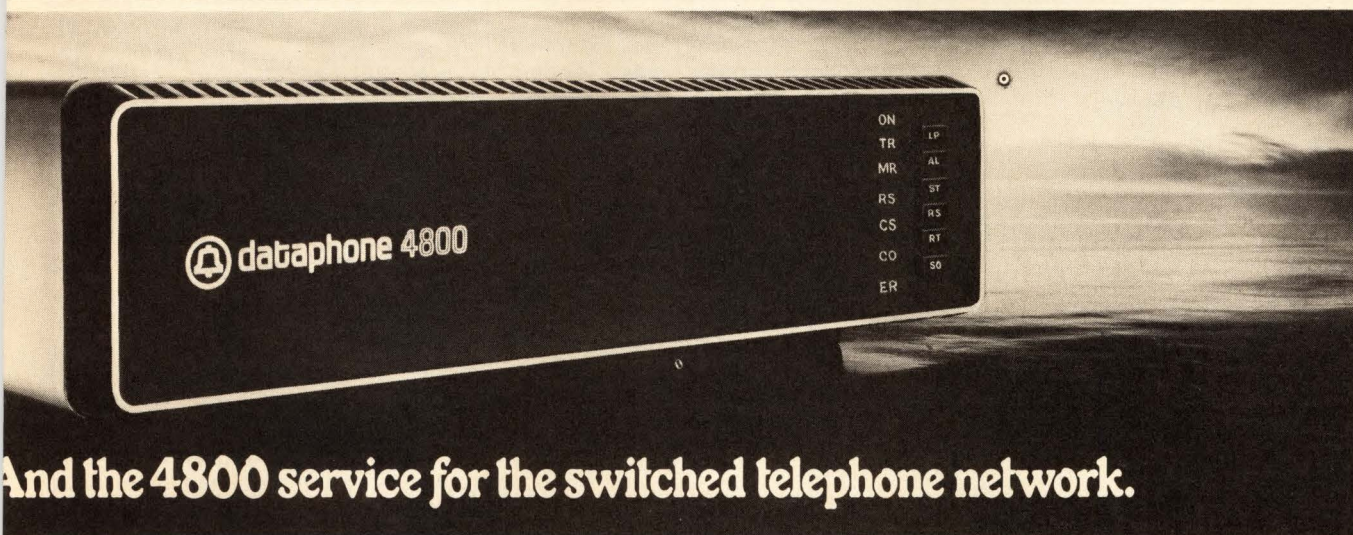
University of Wisconsin
Madison, WI



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Dataphone 4800 service features automatic adaptive equalization. Turnaround times of 50 milliseconds for private lines and 50 or 150 milliseconds for the switched network, as you choose. And low monthly charges.

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We hear you. 

Gremlins

Manufacturer and model	Olivetti DE520	Olivetti TCV270	Omron 8025A	Ontel 4000	Pertec 7100	Plantronics DS-150
No. displays per controller	SA	32	SA	SA	64	SA
Programmable	Yes	Yes	Yes	No	Yes	Yes
TTY compatible	No	No	Yes	Yes	Yes	Yes
IBM 2260/2265 compatible	No	Yes	Yes	No	No	No
IBM 3270 compatible	No	Yes	Yes	No	No	No
Char per display/memory	341	480, 1920	1920	1600	960, 1920	64
Displayable symbols	64, 96	96	128	112	64, 96	64
Function keys	None	12	16	None	5	Yes
Separate numeric keygroup	Yes	Opt	Yes	Yes	Yes	Yes
Tabulation	Yes	Yes	Yes	Yes	Yes	No
Line/char insert/delete	No/No	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	No/No
Roll/split screen	No/No	Up/Yes	Yes/Opt.	Yes/Yes	Yes/Yes	No/No
Purchase price	\$4,600	\$3,800	\$3,250	\$2,975	\$2,650	\$25/mo

This section of our crt chart mysteriously disappeared last month. We're sorry.

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New York, NY 10022
(212) 371-5500

CIRCLE NO. 150

Omron

432 Toyama Drive
Sunnyvale, CA 94086
(408) 734-8400

CIRCLE NO. 151

Ontel Corporation

3 Fairchild Court
Plainview, NY 11803
(516) 822-7800

CIRCLE NO. 152

Pertec

9600 Irondale Ave.
Chatsworth, CA 91311
(213) 882-0030

CIRCLE NO. 153

Plantronics Inc.

385 Reed Street
Santa Clara, CA 95050
(408) 249-1160

CIRCLE NO. 154

Achtung!

Sir: *Kassenartzlicke* should read *Kassenärztliche*

It seems you have some teutonic troubles too. You managed to make three mistakes in one word:

- (1) t and z were interchanged
- (2) a k appeared in place of an h
- (3) the two dots above the second a were missing.

Anton Glaser

1237 Whitney Road
Southampton, PA

In Claude we trust

Sir: In Kozdrowicki and Cooper's article on computer chess (August 1974), Claude Shannon is erroneously identified as an English mathematician. Shannon was and is an American, although his main paper on programming a computer for playing chess was published in a British journal (*Philosophical Magazine* (7) 41, 256-275, 1950). He did his work on chess programs at Bell Laboratories, where he also laid the foundations of information theory. Since 1957, he has been Donner Professor of Science at MIT.

Samuel P. Morgan

Bell Laboratories
Murray Hill, NJ

Lib and let lib

Sir: Wake up computer persons! I was pleased to note *Computer Decisions'* article on the problems women face in the computing field (May, 1974), and I was initially impressed by your editorial, though subsequently dismayed by the sexual overtones of its final declaration of women as "... that other, more popular, sex."

You imply a commitment to do away with sexism in your magazine, yet the cover of the May issue is pornographic—"Is that a pistol in his pocket? ... and the June issue contains an offensive "ad full of female flesh" from Kennedy Data Systems, Inc. However, it is the cover of the July issue which I find particularly outrageous.

I suspect you could control the type of ad you print; I know you could control your art director. I

doubt that you would let him depict blacks as shuffling cotton-picking slaves on your cover. Why, then, did you allow him to depict women as sex objects. You cannot deny that the women on your July cover have breasts; no faces, no minds, just breasts and nipples. As if the cover weren't bad enough, it is explained by the double entendre of the last sentence of the cover blurb, "Perhaps you will take note of the electric Gypsy's tips." Then, to add insult to injury, your "cover story" itself is half a page long with the offending picture reproduced on the remaining half page.

I am appalled by your hypocrisy and disgusted by your use of a "professional" magazine for the exploitation and degradation of women.

Brenda Ferriero

Cambridge, MA

Editor's note: We thought they were buttons.

List, but not lassed

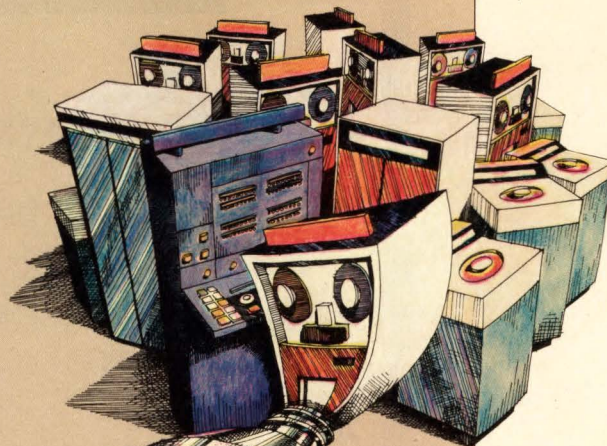
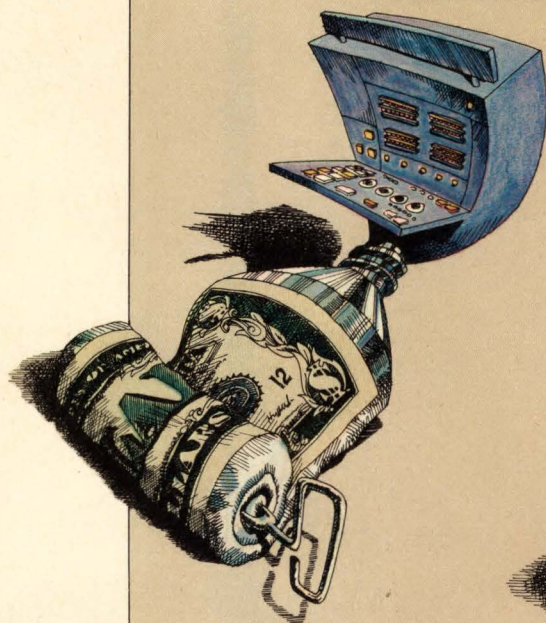
Sir: Mary Ellen Padin's request in the August issue of *Computer Decisions* that her name not be abbreviated as M. E. Padin on the address plate is certainly valid. Being called M. E. Fowler doesn't bother me very much. But, CD, or another periodical, sells its mailing list to purchasers who transform my name to Mr. M. E. Fowler. Promotional material addressed to Mr. M. E. Fowler is discarded since there never has been a person by that name at Physics International.

Ms. M. E. Fowler

Applied Mechanics
Physics International Co.
San Leandro, CA 94577

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per month
rental

\$48,406
per month
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ITEL squeezes more out of your computer dollar than IBM. Now you can get a whole computer system from ITEL for less than what IBM charges for just a central processing unit.

The numbers speak for themselves: For \$51,238 a month, IBM rents you a single 370/158 CPU (includes two extra shifts). But for \$48,406, ITEL leases you that same 370 CPU with ITEL Monolithic Memory, 24 ITEL disk drives plus their controllers, as well as 24 ITEL tape drives with their controllers.

To put it another way, if you were to rent a comparable system from IBM, it would cost you \$81,846 a month. Almost double our price.

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MENU



Entrees

Roast turnkey with walnut addressing.....	\$3.69
Diskette of beef.....	4.80
Fiche & chips	1.70
Corned beef hasp	2.25
Ram chops	3.89

Desserts

Comquats	1.
Pomegranates	ea. .8
à la mode	.7

Beverages

Hard punch	.7
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Marketing: orders or disorder

*To market, to market to buy a fat pig
Home again, home again jiggity-jig.*

Oh, if it were only that easy! Ask any wizened and whiskered marketing veteran. You'll surely hear tales of endless sales strategy meetings, of fabulous wheelings and dealings, and of plain old arm twisting. Like the policeman's, the marketer's lot is not an 'appy one.

Selling a computer is not like selling anything else. The product is not consumer-oriented. It's not something that most people need. But competition among computer manufacturers is just as keen as the rivalry in the automobile industry. The marketer caught napping by fast-changing industry trends is easily outmaneuvered by his competitors. So the computer consumer is wooed as diligently and lavishly as any.

The annual trade shows are proof. Each year manufacturers marshal their creativity and channel money and minds to stage dazzling displays. To the bewildered show-goer, the extravaganzas are mind-boggling. For the manufacturer, the show is a source of countless sales leads. Whatever the outcome of these sales contacts, each manufacturer follows them with carefully planned promotional efforts.

Another source of potential customers is the industry trade press. Media advertising is not only the sustenance of the trade press; it also provides advertisers with invaluable leads through the ubiquitous bingo numbers.

Win or lose in the numbers game, manufacturers are finding that a new market is developing outside of

the computer elite. This market consists of those companies who, because of rapidly growing sales or governmental pressures, are moving toward computerization of some portion of the business. This first-time user presents a special problem to the computer industry. His needs are not clearly defined because he is not sure what the computer can do for him. He has to be educated, not indoctrinated. He is a consumer. The product must fill this current needs and must grow with him. Reaching him calls for a special menu. And in the pages that follow, you'll learn how he and others are courted and won.

For an appetizer, you'll see how one company cooks up a dish to ply that first-time small business system user. Mixing the right gear to sate his hearty appetite calls for a zippy recipe.

Our entree is a delightful combination of engineering talent and marketing wisdom. A top terminal chef takes you through his technological kitchen and spices your visit with a peak inside his oven.

For those of you who like OEM cooking, there's a palate-pleasing platter filled with how to market to the small-volume user.

A tempting dessert follows. "One-stop shopping" tells how computer manufacturers market their wares topped with lease contracts. Their customers can eat their cake and have it too.

For a late night snack, you can munch on our modem and multiplexer survey. We're sure you'll enjoy a byte from these tidbits. ☐

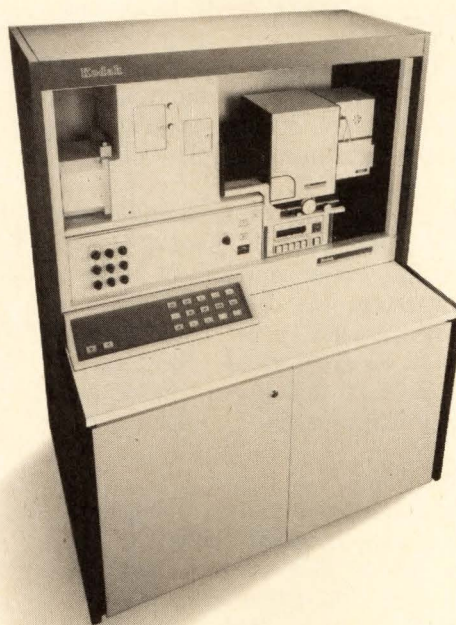
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Kodak: for better use of information.



The small business system market

Selling a small business system to the first-time user is not easy. The system must meet his current and future needs.

by Douglas Baker
Qantel Corporation

The first-time computer user represents the largest single market-share in the industry. He continues to present the most direct and difficult challenges to manufacturers whose marketing philosophy—rather than being simply a promotional approach to selling—has to be directed to filling the user's needs today and solving his problems tomorrow.

Traditionally, the first-time user's problems have centered on his accounting needs. Over the years he has been in a constant state of decision-making, has constantly had to evaluate new machines, new models, new services.

Most users bought several kinds of accounting machines, did some of the work manually, used a variety of independent and bank service bureaus or tried a combination of all of these. No decision really resolved any problems because no system could handle more than a portion of his total needs. Most failed because of the manufacturers' inability to understand what the first-time user really needs.

What is he all about?

The typical first-time computer user is a businessman whose enterprise sells between \$500,000 and \$20-million worth of goods and services annually. Statistically, there are some 300,000 to 400,000 companies like his across the country. The evolution of his business wasn't planned. His growth, plus the ever-increasing number of rules instituted by governmental and accounting bodies, has deluged him with a flood of accounting problems which consume an inordinate amount of his time. Because of competition and the tight money market, it has become increasingly obvious that if he doesn't automate in some fashion, he'll fall behind and lose his competitive edge.

Yet he's not procedurally structured or properly coded to handle the demands of data processing. He and his key people have a fear of data processing. He can't afford to lose any of these people during a transition to automation. A dp department or organization of any kind is simply not a solution to his needs. He wants to be able to understand and control the dp function, yet its mystique is such that he feels he cannot.

These, then, are his problems. They have been his problems for quite some time.

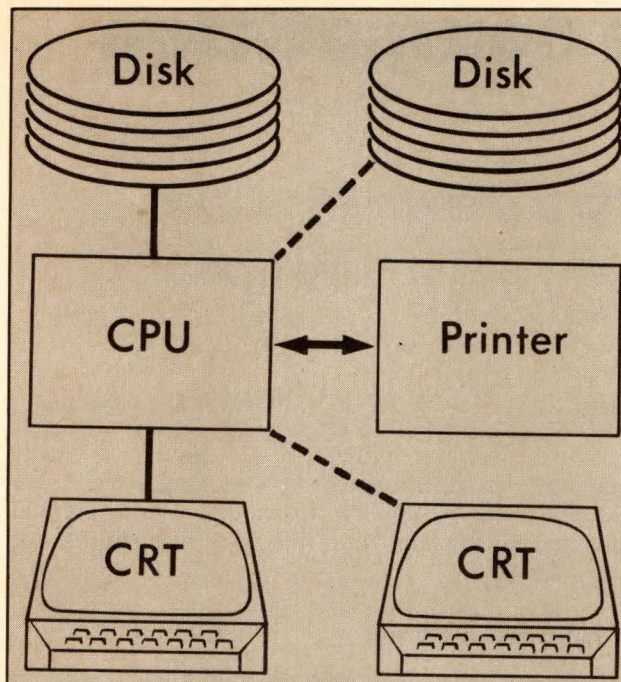
Until recently, the technology to solve all these problems at once was not available. The result was that product compromises were made when manufacturers decided which products would be produced. In other words, even though manufacturers and marketing organizations knew what the user wanted, the product was not available.

Meeting his total needs

Only recently has the first-time computer user been able to buy a product that could meet his total needs rather than one which could handle only a portion of them.

Given this new level of technology, deciding how a product is going to look to the first-time user then becomes the most important marketing consideration. Addressing the new user's total needs means that a business computer manufacturer must be prepared to offer him the following:

- There must be no sophisticated computer-oriented personnel required within the customer's environment.
- The machine should look unsophisticated and be operator-oriented, as opposed to the common conception of a big computer;
- The system should be easy to use and afford simple error-correction routines;
- It must be inexpensive, ideally no more than the cost of adding another secretary;
- It should require no special wiring or computer environment;
- Existing personnel and management must be able to learn how to operate and program it for the firm's own support;
- It must be disk-based to provide instant access to stored data;
- Its data base must be large enough to accommodate the first-time user's prime accounting functions: Order entry, invoicing, inventory control, accounts receivable;
- It must have an operating system which permits an English-like application language;
- It should use crt's to coach operators from step to step, and provide visual verification;
- Operator devices should be able to be dispersed around the company facility for the convenience of various operations;



The small business system

This is a standard configuration for a small business system: A 16k or 20k processor, a disk capable of storing several million bytes, a crt and keyboard for data entry, and a low-speed printer for hard copy. The 500,000 small businesses in the U.S. are the targets for the small systems manufacturers. For most of these first-time computer users, the systems will mean smoother operation and higher profits. But the right system can also mean smoother and quicker growth. What is the right system? Such a system must be modular; it has to be flexible enough to allow for additional disk capacity if inventory size doubles, additional hard copy devices if billing increases, and more crts as more operators are required to meet increased orders. The system must also be people-oriented. It should not require sophisticated know-how to get it running and keep it running. Nor should the system require a special operating environment.

- It must be modular, to risk a much used but much misunderstood phrase.

Pinpointing what modular means

To the first-time user, modularity means growth. He can grow with his computer purchase in a five-year cycle on five different levels:

- The number of operators;
- The amount of storage required;
- The degree of printing capability available;
- The number of applications that can be added;
- The retention of his initial programs and systems design.

A few examples might further pinpoint what modularity means to our first-time user. Say he's running an electrical parts warehouse with 1,000 customers, 4,000 inventory parts and one operator. Then his order entry volume doubles the first year. He has to be assured that he can handle that doubled volume without changing any systems or procedures, ideally by adding only one more operator and one more crt.

The same sense of modularity would have to apply if he took on a whole new product line and had to double his parts inventory. He needs to know that he can simply increase his disk storage base by a factor of two without changing his systems or procedures. In the same way, he has to be able to count on the capability to add another line printer quickly, or replace the first with a faster one, should his billings double.

Numbers of applications are no different; he has to be able to add applications as he needs them without worrying about outgrowing his system and having to go to another and different set of hardware and software. In other words, to him modularity means having the ability to make the data processing decision once and for all.

Hands across the water

Since the first-time user is not the usual data processing customer, the manner in which this profiled first-time user is reached to explain a product has to

be somewhat atypical.

He falls into the classic category of a consumer. Among other things, he cannot be expected to read data processing journals. As a consumer, he can be contacted more easily and logically through private, by-invitation-only business shows, or through advertising in media such as radio, television and daily newspapers. This contact has to be supported, throughout the entire advertising program, with a "call to action," with a consistent stress on the product's ease of operation and implementation.

Once contacted by the user, a manufacturer has to be able to demonstrate his product and its simplicity. He also has to show the versatility of the system, its ability to handle multiple applications, many of which are probably being done manually by the prospective user. Of utmost importance, he must show that the product can grow with the customer.

Product synergism essential

It isn't enough to have a product which meets only the first-time user's current needs. It must be a matter of corporate policy that new products and capabilities generated by research and development must be of a synergetic nature to the existing customer base.

Too many companies in the past have used—or misused—technology to develop a better product, but in the process they have made prior models obsolete. From the standpoint of customer support or consumerism this should not be allowed to happen. □



Mr. Baker is president of Qantel, a manufacturer and marketer of business computer and data communications systems. Prior to taking the Qantel post, Baker founded Basic/Four Corp., another business computer systems maker.

Outsmarting the competition

The right measure of marketing and engineering talent have kept Sycor cooking in a very competitive market.

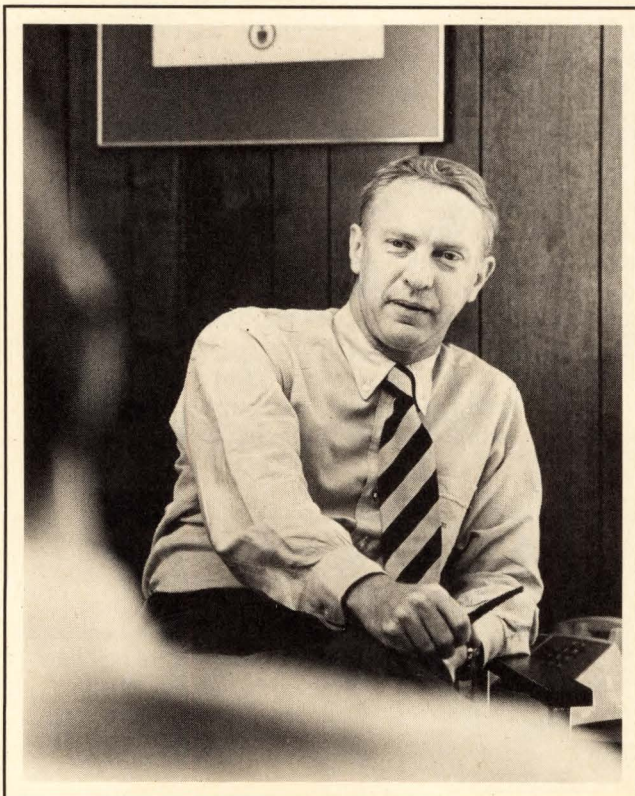
by Hesh Wiener

"Building computer terminals is like building automobiles," according to Samuel Irwin. "The bulk of the money goes into glass, metals and plastics."

Irwin is not in the auto business, but the terminals made by Sycor, Inc., the firm he presides over, are. They're also in just about every other business you can name, sometimes sold one by one, at times installed by the truckload. Sycor's product—the intelligent terminal—adapts to its environment because it is programmable. But adapting to the rigors of competition is more of a mechanical engineering problem than a software one.

While the user is most concerned about interfacing, error correction routines and forms capability, the manufacturer of intelligent terminals must devote enormous energy to improving those parts of a terminal often taken for granted, such as a printer, a tape drive, or a diskette. Software, once written, may be reproduced for next to nothing, but electromechanical gear costs money each time the product is shipped. Each

Samuel Irwin



item must be tested. And every moving part in the field represents a liability: When the user's terminal fails, chances are that the problem is mechanical, not electronic.

To halve and halve not

Right now the electronics in a terminal represent only a small fraction of the product's cost, even though the circuitry makes an enormous difference in product performance. Sam Irwin feels that the cost of a terminal with a printer breaks down neatly into halves.

"The printer is half the cost [of such an installation]. Then you can take off the other mechanical functions such as keyboard and storage unit, which are half the cost of the tube unit. Finally, the bare tube itself is half cabinet and power supply and cooling."

For Sam Irwin, the progress made in integrated circuits has not been a source of great price reductions. Advances in circuitry make it possible to build better products, and Irwin keeps a watchful eye on every new microprocessor that comes out of the semiconductor industry. But significant changes in the intelligent terminal business will result from the development of better peripheral devices, or, more accurately, peripherals tailored to the particular needs of terminal users.

"The market has a great deal of similarity to the minicomputer market. But it's ten years later. The tools that users need haven't been announced yet."

Irwin is referring to the development of mini-peripherals, such as compact and low-cost disk drives and printers that made the mini an end-user product. When the only peripherals available were those tailored to large mainframes, the high cost of the stand-alone mini configuration belied the low price tag of the cpu. Today intelligent terminals may run all day as stand-alone devices, but the maturation of this technique awaits better storage, printing and transmission devices. At Sycor, as at other intelligent terminal makers, such peripherals are constantly under development.

Soup to nuts

Sycor may be an extreme in the terminal business because they make just about every part of every system that they ship. They make cassette drives, printers, diskette drives, and constantly look for new items for their menu. Irwin feels that his firm's location—near Detroit—is an asset.

"We have no trouble finding people who can make

mechanical gear to close tolerances. The car industry is flooded with such skilled labor."

When asked about the user's requirements, Irwin reveals a mystery he believes is common to all terminals makers. Users, never having seen that which is being invented, cannot understand how they will use the next generation of terminals. "How," he asks, "can a customer tell you how he will use a tool he has never seen?"

What Irwin does is extrapolate—from the minicomputer market, from the progress made inside his development labs, and from his own gut feel for customer needs. His vision, then, is only an approximation of of the marketplace as it will be. The success of Sycor, which Irwin feels has the largest market share of any independent smart tube company (with Datapoint as a tough second runner), attests to the value of his judgment. He believes that cost alone is no basis for product development. He feels that users will gain more from a terminal that is more productive than from one that is less costly. His analysis is similar to his cost breakdown.

Terminal users, according to Irwin, must also pay for personnel time, office space, changes in business structure, and mainframe time whenever they use his product. If an installation can get more work done in a simplified fashion, they are ahead. A cheap terminal that does nothing to relieve bottlenecks is not, in Irwin's view, a viable product.

Thus human engineering is an important part of the Sycor philosophy. While the Phillips cassette has been associated with sticky engineering snags, its human engineering is excellent. So Sycor went for cassette storage on its terminals. The diskette is another natural. These platters hold a useful chunk of data. They may be used either as a random access device or a tape. Operators can change them rapidly, store them handily, and keep them intact without much care. Sycor's entries in both these areas appear to work well and are well received by customers. Such products are available throughout the industry.

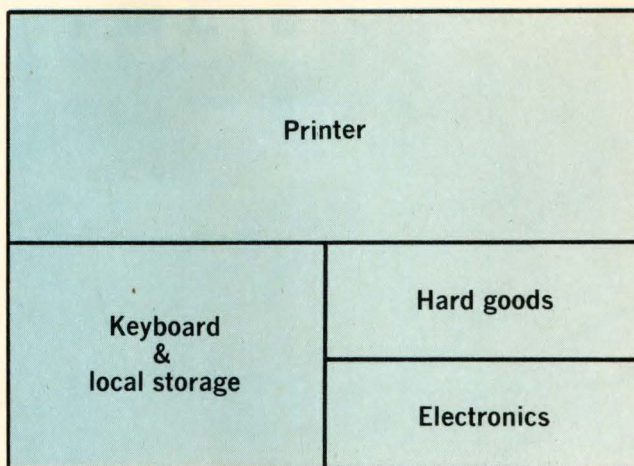
What's next? Printers will be greatly improved, Irwin believes. One trend he is carefully watching is a move toward full character sets. Users will opt for lower case letters when they can be purchased economically. Users will also employ other printer features to produce more readable reports. The line printer, no matter how small, may never fill the needs of the typical (read most numerous) user. So character printers, including matrix and full character devices, will have to grow up. Most terminal users really need hard copy online, and the rush to sell printers is a strong current in the terminal business.

Nervous novices

All this spells trouble for new firms coming into the terminal business with purely an electronics background. Irwin believes it takes three to four years to build a reliable electromechanical peripheral, test it and get it into a customer's hands. This means new firms will find the competition formidable.

"In the early days of the minicomputer business, you could build a cpu with very little capital, buy oem peripherals and off you went. But the gestation period for an electromechanical peripheral is, say, four years, and

Terminal costs



The cost of an intelligent terminal with a printer breaks down cleanly into halves. The printer is half the total cost. Half of what remains goes for a keyboard and electromechanical local storage. Only about half of the basic tube cost is electronics, the rest is a cabinet, fans, etc. When costs go down, chances are the reason is electromechanical. When performance goes up, look to electronics.

the development requires an enormous amount of money."

Even though Sycor is an innovative company selling the highest level of technology it can produce in electromechanical or electronic products, Sam Irwin feels that the user must be wary of the fast pitch. Raw technology can be dangerous in the hands of a naive user. Gadgets by themselves don't make for business economy.

"We have to plan years ahead to provide the power the user will need. But we try to move with caution. Business records are too valuable to be moved from one installation to another quickly and thoughtlessly. The user has got to have the whole system to avoid confusion.

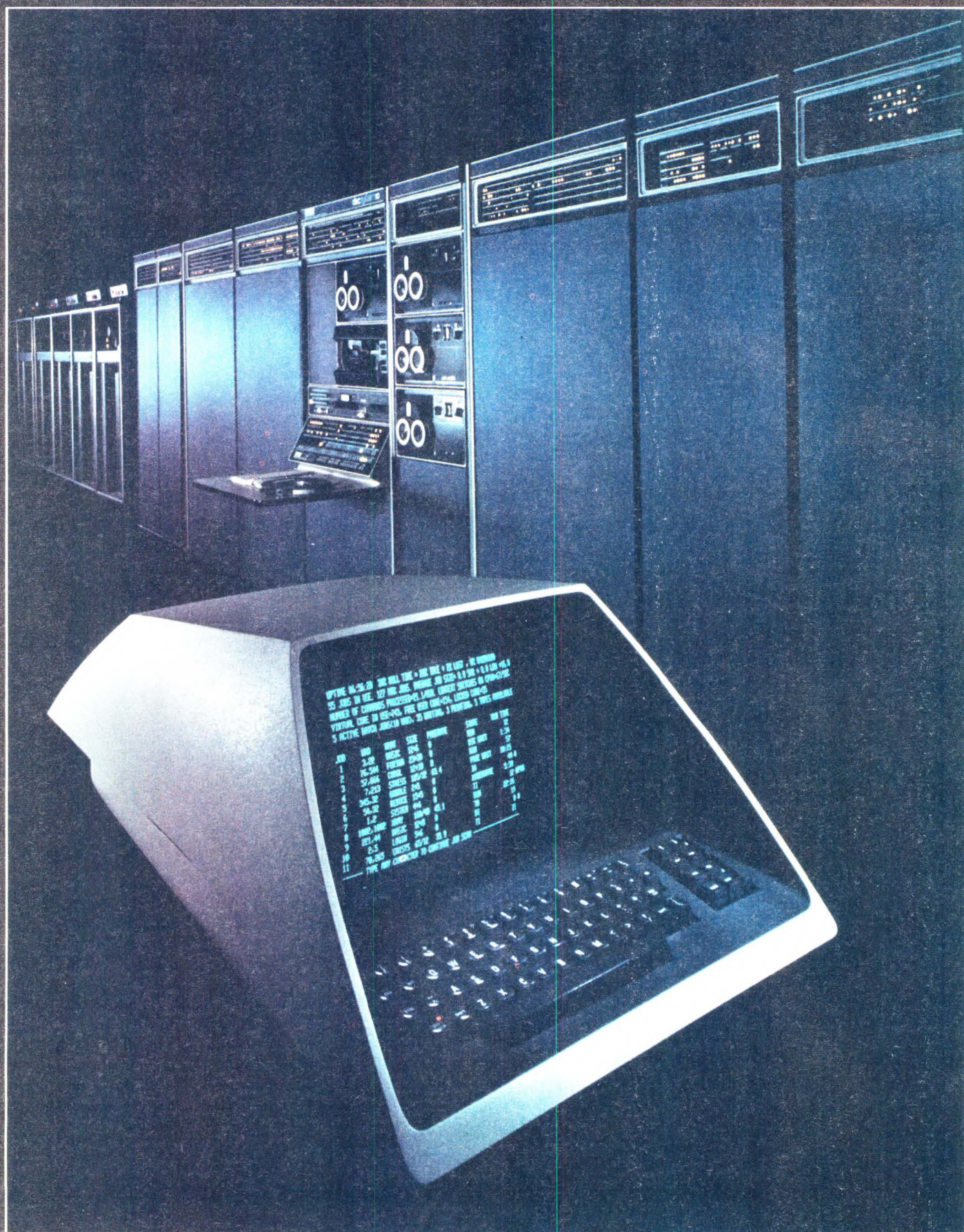
"We can build all kinds of wonderful things, but we must support them in the installation. We have to make sure the user doesn't lose the integrity of his data base. Perhaps our business runs too fast. We've seen it over and over again in the last 20 years, and it was always the customer that suffered."

How do terminal makers keep the user satisfied? Support and service. Applications programs, languages, operating systems—these terms have become the keywords of the tube business as they became the major factors in mainframe and minicomputer markets before. But again, the time lag, the newness of the market must be understood by the user.

Speaking of service, Irwin feels that it must be properly funded to be done right. His firm makes field engineering pay its own way with service revenues and maintains strong control in that division that give the user what he wants. When Irwin sells gear, he uses this service force as a marketing tool. It's one reason he's not scared by mainframe makers.

Speaking as a David to the industry Goliaths, he adds, "They've got their problems, also. We're doing well, so I guess they will too." □

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digital

One-stop shopping

Computer manufacturers and distributors
who finance the gear they sell
benefit from a very successful marketing concept—
one-stop shopping.

by Charles M. Spiridon
Citicorp Leasing, Inc.

Many computer manufacturers maintain their own financing operations to serve customers unable, or unwilling, to acquire equipment through conventional debt financing or outright cash payment. But computer companies that are not able to finance the equipment they sell often rely on third-party leasing companies. Manufacturers and distributors of mini-computers, point-of-sale systems, word-processing, telecommunications and general office equipment often include term-lease financing instruments in their product line through vendor arrangements with leasing companies.

Under these arrangements, the leasing company provides tailored finance packages for computer users. Adding finance experts to his team gives the manufacturer a marketing edge. He is paid in cash when his customer accepts delivery of the equipment; his customer repays the finance company in fixed rental payments over the term of the lease.

To understand how third-party leasing benefits both buyers and sellers, data processing managers should examine the financial and marketing considerations which motivate both seller and buyer to lease.

What motivates manufacturers

For manufacturers, leasing is primarily a marketing decision: "What is my competition offering?" "How soon will the piece of equipment become obsolete?" "Will I have to provide the maintenance?" "Can my sales force learn how to 'sell' financing?" "Should I reduce prices or increase quality and service, rather than provide financing, to remain competitive?" "Should I extend credit along the more conventional lines or create a finance subsidiary?"

These are the questions manufacturers must answer before they decide whether or not to add term financing instruments to their product line.

By marketing financing plans, as well as hardware and software, manufacturers and distributors can sell a complete package to meet their customers' needs. The following principal selling points will make sense to any businessman:

Leasing conserves working capital. It permits re-investment in areas that generate more profit or will give more cash with which to work on a current basis.

It provides virtually 100 percent financing. Only the first rental payment, which serves as a binder, is

required in advance.

A portion of the savings or profits produced while using the equipment can be set aside for rental payments. This is often termed pay-as-you-go financing.

Leasing makes bookkeeping easier. Under a lease, there is no need to keep track of depreciation, interest and other details.

Leasing can provide present value savings when compared with alternative financing forms. Over the term of the lease, real cost may be lowered as a result of the combined impact of the economy's inflation rate and the tax rate of the company.

Leasing provides flexible terms and options. At the end of a lease term, for example, the lessee may renew the lease, return the equipment to the lessor, purchase the equipment at the market value, or purchase it at a previously agreed upon price. Manufacturers may even agree to allow trade-ins against new data processing installations at the end of the initial term.

What manufacturers gain

By making such equipment financing services available to customers, manufacturers and distributors benefit in many ways. But no gain is more important than this: The leasing options help companies increase sales.

When salesmen can offer extended-term financing options, they enjoy the distinct advantage of discussing equipment in terms of low monthly payments. By contrast, outright purchases require large capital outlays.

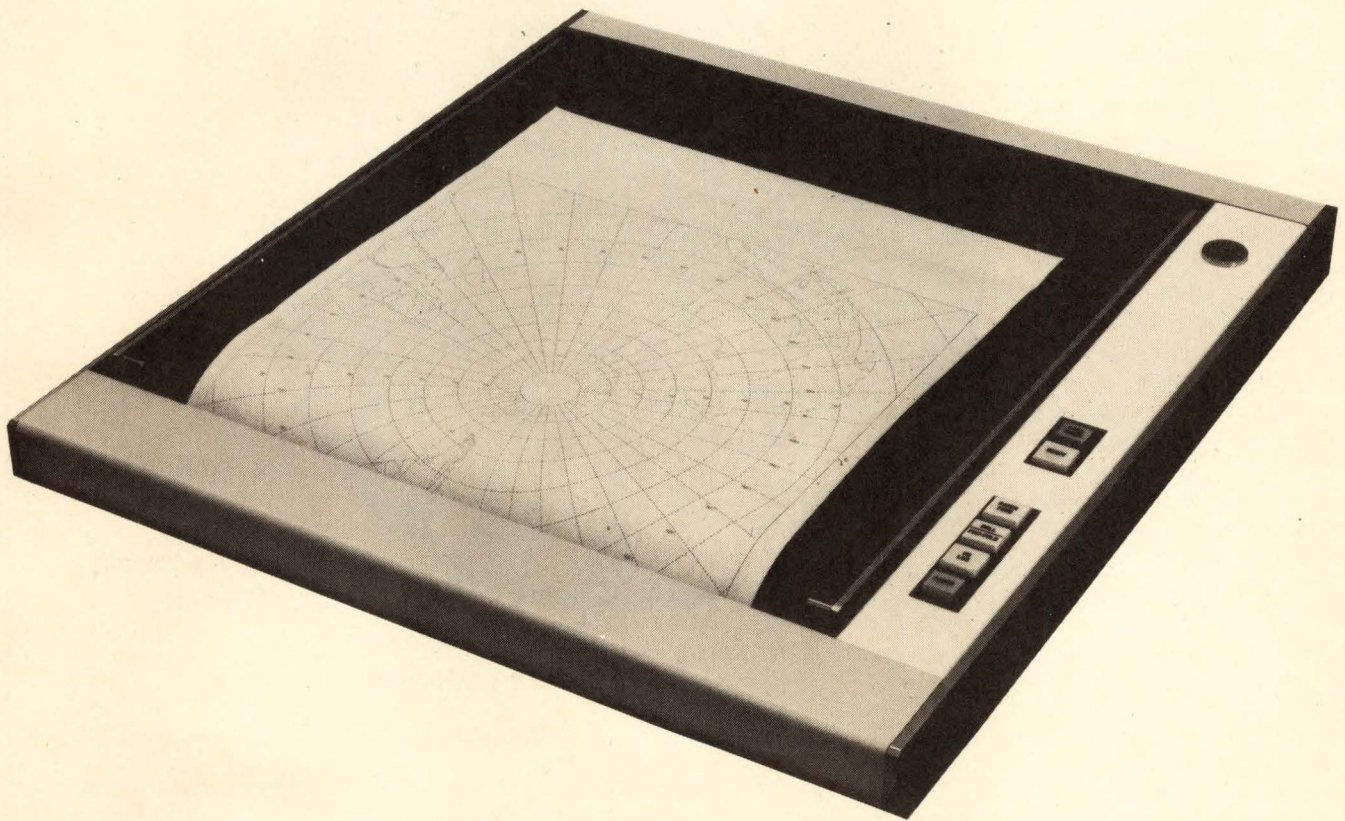
By making leasing options available, manufacturers and distributors also create possibilities for trade-ups. Customers may recognize that they can afford higher-priced, better quality equipment when they think in terms of pay-as-you-go financing. When a buyer considers low monthly payments, he often realizes that he can get a better model for only a few dollars more a month.

Moreover, the manufacturer usually has an opportunity to get repeat sales. Citicorp Leasing, for example, automatically notifies manufacturers when financing contracts on their equipment are about to end. This system is a trouble-free method of tracking customer requirements.

Increased foreign company penetration of domestic markets is another factor that has led manufacturers in the United States to turn to third-party lease fi-

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*Bi-Scan Patent Pending

nancing. Confronted with increasing competition from abroad, manufacturers are using their established financing sources to extend credit to their customers.

In terms of compensation, a third-party lease sale is no different from a cash sale. A manufacturer's or distributor's invoice is paid when the customer accepts delivery, thus eliminating accounts receivable and providing additional funds for investment. Also, in terms of sales commissions, lease sales are cash sales.

The user turn-on

For users, leasing is principally a financial decision:

"What is the effective rental rate if I lease?" "How much cash will I have to pay out?" "Will there be tax savings for me?" "Should I purchase the equipment outright, or do I have conventional financial sources available to me for the acquisition of this equipment?"

While looking for the right answers to these questions, users will be influenced by many major considerations:

- **Tight money:** By leasing capital equipment, particularly when the cost of money is high and the availability is low, a user can conserve his cash for other profit-generating investments. Moreover, he can keep his credit lines open to meet short-term capital requirements.

- **Thin profit margins:** Inflation can lead to a degenerative cycle in any business. When manufacturing costs rise, pricing often fails to keep pace. The resulting profit squeeze can cause companies to cut capital expansion plans,

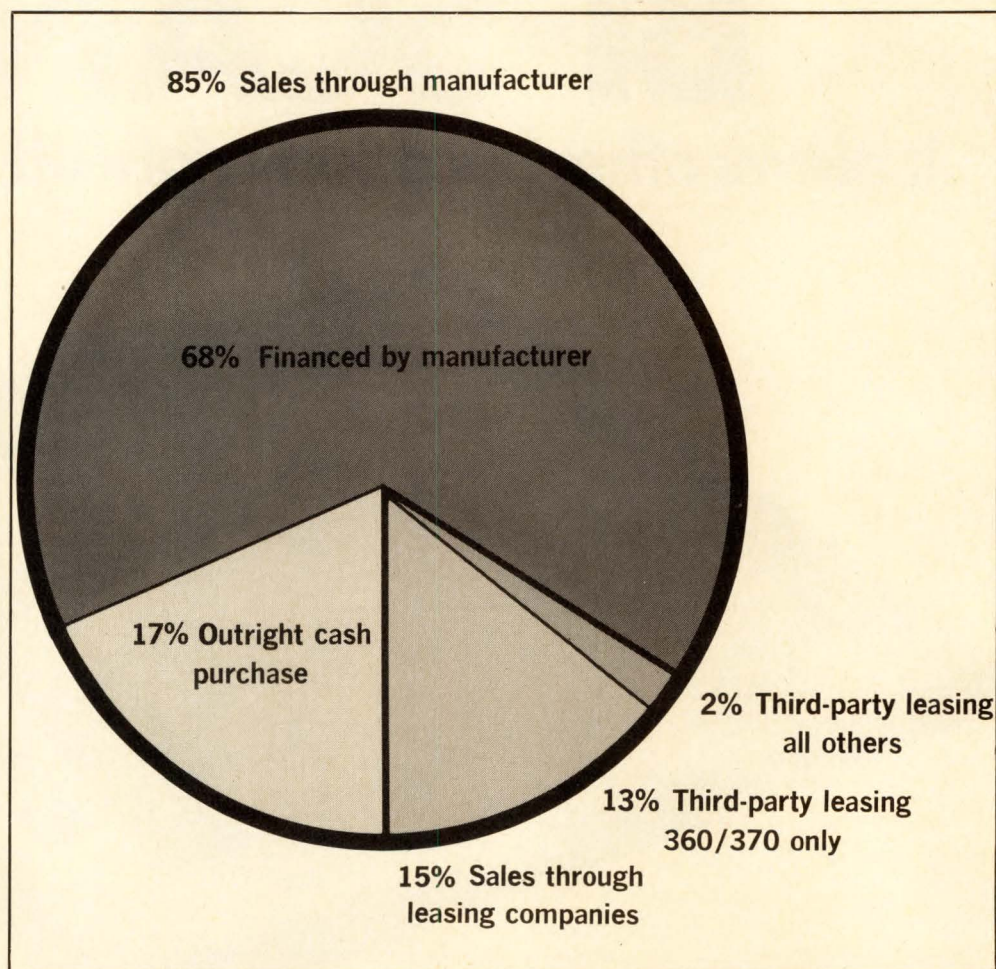
which will lead to reduced profits. Leasing can break this cycle by providing expansion capital, often at tax-deductible expense to the lessee. When lease rental payments qualify as deductible expenses under Internal Revenue Service regulations, users can defer corporate income taxes to the future and thus gain intermediate-term cash flow dollars.

- **Increased capital formation rate:** Aside from cost and price considerations, computer users may want to seek additional sources of funds to take advantage of accelerated depreciation allowances or investment tax credits. Leasing can help provide such new sources of expansion capital.

- **Increased operational flexibility:** Leasing provides line management with the opportunity to acquire

needed equipment after capital budgets are closed. The line manager often has the option of approving lease financing on the spot in order to get a piece of equipment into his production cycle. This is one of the key marketing considerations behind leasing and other related financing forms.

- **Increased capital productivity:** Firms tend to acquire dp equipment when they have to meet strong competition head on. This need to automate promotes more aggressive management and expansion of a company's asset base. Leasing provides a flexible means for using capital resources more efficiently and for managing assets more aggressively.

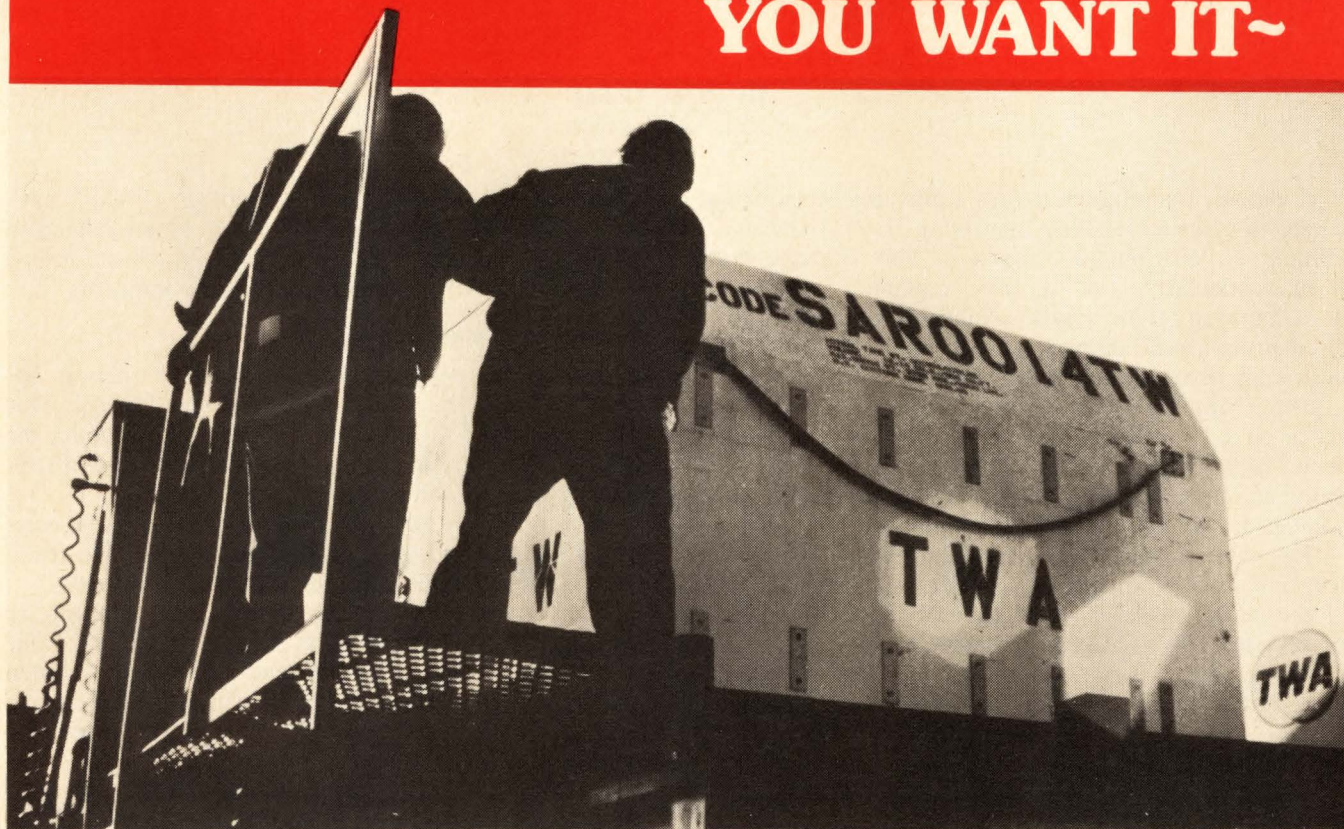


It's a lessor's market, as the graph above shows, with computer manufacturers doing much of the leasing themselves. Source: The Computer Lessors Association.

- **Learning curve effect:** After more than a decade in the equipment finance field, Citicorp Leasing managers have observed certain psychological changes in the marketplace. There is an increasing desire on the part of management to understand the "time value of money" concept. In an inflationary period, for example, the dollars paid out over the term of a lease decrease in purchasing power, thus altering the real cost of acquiring equipment over a period of time. Also, businessmen are beginning to realize that use of a piece of equipment, not necessarily ownership, generates profits. □

Mr. Spiridon is manager of national finance programs for Citicorp Leasing, Inc., a world-wide leasing organization headquartered in New York City.

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Marketing to the small-volume user

by **Ralph Gabai**
Pertec Corporation

Computer manufacturers face a dilemma in assessing where to concentrate their marketing efforts—on high-volume or low-volume customers. This situation has been particularly true of OEM computer peripheral manufacturers. The question raised is this: Should a company place all its marketing efforts on a few major customers or satisfy a greater number?

Either approach can be dangerous. If a company relies on a few major customers, changes in the customer-supplier relationship can be disastrous. If a company attempts to be all things to all people, its resources are likely to be spread too thin to be effective.

The solution is to develop a balanced marketing effort that enables a manufacturer to reach both segments of the market without any deterioration in his product or service. This is a critical balance that is based on planned utilization of a company's resources for maximum impact on the broadest possible customer base.

From both ends

Although the high-volume customer is a significant and substantial factor in a company's business, Pertec has adopted a marketing approach that enables it to continue supplying and serving the low-volume marketplace without sacrificing or diminishing the resources needed to support the high-volume user.

Too often, companies dismiss the low-volume market because it can be too expensive to reach. However, it need not be. And, there are significant advantages for the peripherals manufacturer to pursue low-volume users. First, it gives balance to a customer base which minimizes the adverse impact that can occur when concentrating on high-volume users only. Second, and most important, low-volume users represent future growth potential for their suppliers.

It's also advantageous for the low-volume user to deal with an established peripherals manufacturer, since this manufacturer offers

- A mature product and established production capabilities. The user knows the product will function and the manufacturer can deliver.
- A substantial customer base which indicates the supplier will be in business in the future.
- Applications and engineering support. Because of the substantial customer base, the manufacturer has broad knowledge that can be applied to assist the user in the integration of his system.
- Customer services and extensive technical documentation. Again, because of the substantial customer base, the manufacturer has the necessary support capabilities to insure that the product functions and continues to function within the system.

Most low-volume users are companies entering new

markets or developing new technologies. They have enough troubles without additional problems related to peripherals or components. Dealing with an established manufacturer virtually eliminates these concerns.

A four-level approach

Pertec has developed a four-level marketing approach to penetrate the low-volume marketplace. This includes identifying the low-volume user, reaching the low-volume user, selling the low-volume user and supporting the low-volume user.

It is relatively easy to identify large-volume users because of their visibility in the marketplace. However, with the low-volume user, identification is difficult.

There are two basic areas to search when trying to uncover the low-volume user. One is to analyze your penetration in current known end-user markets. Often there are smaller size companies within a marketplace you are already serving. Or, they may be on the periphery of that market.

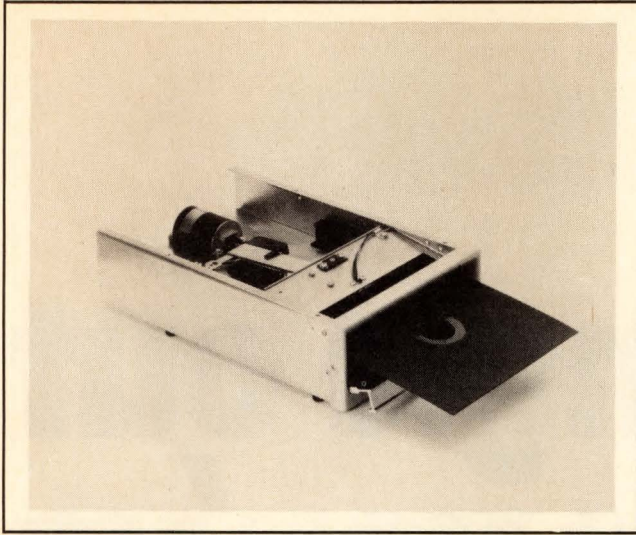
A more important area to examine is the emerging technologies to determine if your product expertise can be applied. With new technologies come new companies, creating new markets. Since these are embryonic markets, the companies serving them tend to be low-volume users. For example, one rapidly emerging technology is microprocessors and their system applications. This, in turn, creates an entirely new marketplace for the application of new or existing products such as microperipherals.

Reaching the low-volume user

Pertec reaches the low-volume user by developing a comprehensive package of communications techniques that will convey a message to both the high-volume and low-volume user. The message is sent by advertising in computer industry and related trade publications and by participating in international, national and regional trade shows.

Reply cards or bingo cards are used by readers or show attendees to request information and literature. At Pertec, there are stringent procedures used to insure proper followup. When inquiries are received, a person in the sales department reviews them first to determine if any might be considered hot prospects. The inquiries are then forwarded to the inquiry handling group which immediately sends the requested information. At the same time, the field sales department is informed and is requested to evaluate the prospects and make personal calls if appropriate.

Another technique Pertec uses is the direct response reply card in direct mail campaigns. Using a variety of mailing lists, new prospects, especially low-volume



Pertec flexible disk drive

users, can be reached. Their responses are followed up immediately.

An important principle at Pertec is to keep the user informed. One approach is to supply industry publications with news releases on new products, new literature and new developments. Another approach is a periodic newsletter, such as Pertec's *Peripheral Review*, which features product application stories, tips on tape handling, overall industry information and product developments.

Use an integrated approach

Wherever possible, an integrated approach should be used that utilizes all of these communications techniques. A typical example is a recent campaign developed for Pertec's Diablo-compatible disk drives. The campaign entailed media advertising, direct mail and regional training meetings for sales engineers.

A large direct mail list was used which incorporated different types of prospects. When response cards were returned, a second, more carefully defined card was sent with the requested material. A call from a sales engineer often followed the return of the second card.

The campaign covered a six-month period and resulted in Pertec doubling its share of the disk drive market.

Selling the low-volume user

Before attempting to sell the low-volume user, or any user for that matter, there are several important steps that a company should take. First, a comprehensive sales and product training program should be developed, and a well-defined sales plan should be prepared.

When you are dealing with hundreds of different product models, it is essential that sales personnel, whether direct salesmen or manufacturer's representatives, be thoroughly and repeatedly indoctrinated on the company's products. At Pertec, there are 15 different structured training courses, each lasting from three to five days.

A sales plan is essential to a balanced marketing effort. You need to define precisely your markets and market segments. These must be selected on the basis of your company's resources. Too often, a company

goes after a market too broad to be served by its available resources. This depletes resources before market penetration can be established and the results are usually less than satisfactory.

An integral part of the selling process is to be able to offer technical and service support to all users. One aspect of the support program is to provide every customer with complete and comprehensive documentation. This includes installation manuals, interfacing instructions, application notes and pertinent engineering specifications.

Besides educating the user with this documentation, Pertec offers all customers the same training programs Pertec specialists receive. This enables the customer to become familiar with the equipment he uses.

A worldwide force of customer service representatives is available to handle any problems a customer may face. To facilitate repairs, there are regional repair depots that stock spare parts for all products. In addition, service representatives and our customer's service personnel are kept up-to-date on product improvements and engineering changes through a series of periodic bulletins.

To insure that customers have full knowledge of the peripherals, a quality control program is used that, among other procedures, includes field audits on types of repairs that customers are making themselves. A computer system analyzes the data, and product performance profiles are prepared. Potential recurring problems can be spotted early and corrected.

Maintain balance

Too often, larger manufacturers do not devote enough effort to the low-volume user. Economically, this is not wise. The low-volume user someday could be your next major customer. Reaching him with your product while he is still in the formative stages almost insures that he will stay with you through the years. Working together, the peripherals supplier and user can participate in the growth and the technological advances in new and emerging markets.

Pertec's experience shows that a balance can be maintained between marketing to both high- and low-volume users. To maintain this successful balance, a company needs to:

- Provide full and complete support to all customers regardless of size.
- Continue to give existing high-volume users the complete and dedicated support committed to them.
- Follow up on all user inquiries no matter how insignificant they may appear.
- Use trade publications and trade show exposure to identify and reach potential new users, as well as keep the current user base informed.
- Work closely with the low-volume user in his business endeavors since initial support will help him succeed. As he grows, his product needs will increase demands on suppliers—especially those who contributed to his growth. □

Ralph Gabai is manager of marketing for the Peripheral Equipment Division of Pertec Corporation, a supplier of minicomputer peripherals. He has more than fourteen years' experience in sales and marketing of computers and computer peripheral equipment.

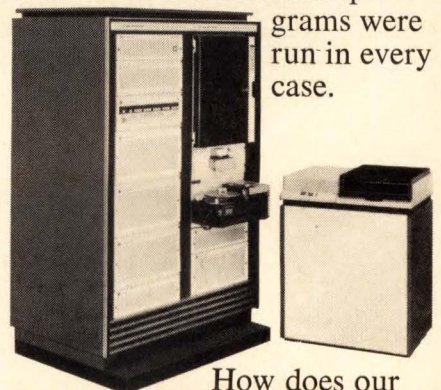
Why single out DEC, when you've

When Varian runs a benchmark, it becomes a milestone. As you can see from these latest figures comparing the performance of our V-74½ with others.

It makes the competition's claims about their superior performance just that. Claims.

All these tests—and more—were run within the last 90 days. On the latest operating systems and compilers. And the same

FORTRAN benchmark programs were run in every case.



How does our V-74½ deliver so much more

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Typical FORTRAN execution times (microseconds)

	V74½	PDP-11/45	Nova 800	Mod Comp II	H.P. 2100
A=B+C	7	33	58	19	51
(double) A=B+C	10	82	61	29	98
A=B	4	14	35	7	13
Do Loop	4	22	10	11	17
A(I,J)=B	22	63	39	28	46
A=Sin(B)	100	251	266	197	1583

speed than other systems?

The VORTEX operating system, for one thing. Augmented by the firmware FORTRAN accelerator and our new Floating Point Processor, no one can argue with the fact that it's the fastest, most powerful, most sophisticated FORTRAN IV processor in the business.

No one beats the V-74½'s synergistic combination of hardware, software and

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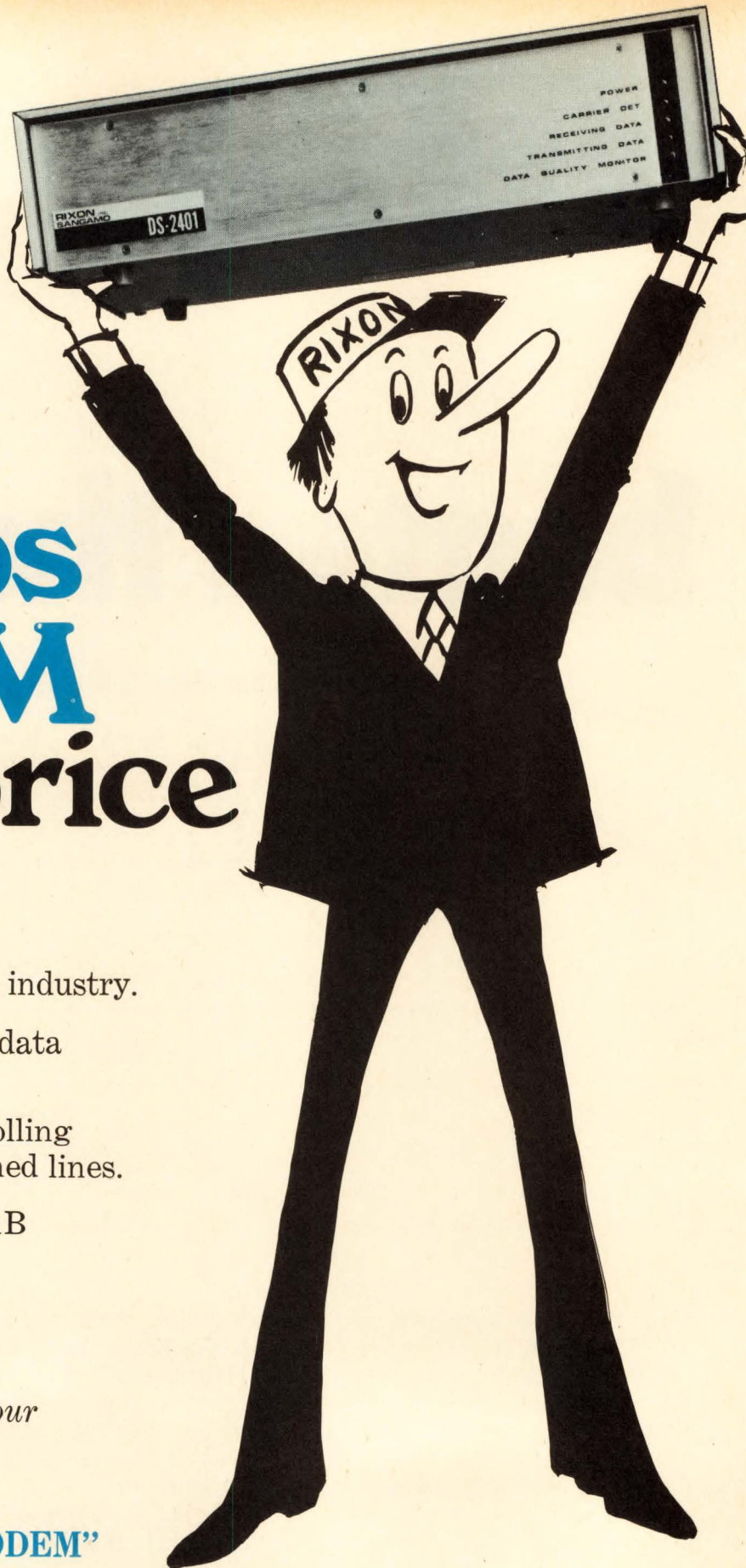
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Modems and multiplexors

This year's crop of line-end gadgets
will enable your business
to branch out more reliably.

Modems and multiplexers are those mysterious boxes that stand between your computer and your communications line. They function as interpreters between the computer's digital tongue and the analog language of data communications. The computer's digital signal is translated into an analog signal by the modulator portion of the modem; the analog signal is converted to digital at the other end of the line by the demodulator.

Transmission speed is dependent upon the modulation technique the modem uses. Certain modulation methods are limited to low-speed transmission, while others permit higher speeds. High-speed or low, data rate is related to the bandwidth required to send the data and ultimately to error performance.

Most low-speed modems are asynchronous and use two-level frequency shift keying (FSK) as the modulation technique. FSK, a form of frequency modulation (FM), permits transmission to about 1800 bps. FSK varies the carrier frequency to represent binary ones and zeros.

Amplitude modulation (AM) is another technique used. AM uses two different amplitudes to represent the binary one and zero. Several levels are possible, permitting more data to be sent in the same time frame. There is a four-level version of AM called quadrature amplitude modulation (QAM). These modems are higher-speed devices using complex and expensive circuitry, but they can maximize transmission on voice-grade lines.

Both AM and FM are suitable to data transmission, but FM has a noise advantage over AM, while AM takes better advantage of the available bandwidth.

Phase modulation (PM) modems are described in terms of the number of phase shifts generated and usually operate at speeds of 2000 bps or higher. PM shifts the transmitted signal a certain number of degrees in response to the pattern of bits coming from the terminal or computer. Generally, PM modems operate in four and eight phases. Two or three times the amount can therefore be sent.

Data sent between modems suffer from the effects of delay and distortion. To compensate for these ills, line conditioning and equalization are musts. Line conditioning is the process telephone companies use to maintain the quality of private, leased line service. Equalization is the technique the modem itself uses to maintain that quality. High-speed modems used over dial-up lines must have equalization since it is usually not known what level of conditioning will be supplied.

Mixing and muxing

As more terminals are added to a network, it becomes necessary to improve the efficiency of the lines and, of course, to save money. Multiplexing data on the lines accomplishes both.

There are two ways to merge or multiplex signals over a single line. Frequency division multiplexing (FDM) lets a number of low-speed devices share one line by dividing the line's frequency spectrum into a number of subchannels: Data from one unit are sent over a high-speed line using one frequency; data from another device, over another band, etc. At the other end, the frequencies are demuxed into the original low-speed streams.

Time division multiplexing (TDM) assigns each low-speed unit a different channel by separating them in time. A TDM continuously samples input channels one at a time for one "bit time." The TDM takes these samples, assembles them into a data stream, and transmits data from all the channels in a fixed time period. Each device gets a brief turn on the line.

The tables that follow list the main features of over 200 modems and multiplexers. Prices for modems are for the simplest configuration available. They can come equipped with or without power supplies and interfacing, with or without operational and test options. Multiplexer prices are also for the simplest configuration, and are usually based on the number of low-speed channels accommodated, data rates and location in the network. □

Win a TI-2500 Calculator!

Complete the information on the survey card bound between pages 48 and 49. **Only those cards with complete information will be selected. Only one card per reader, please.** Deadline is December 1, 1974.

For complete modem/ multiplexer data

Circle number **480** on the information retrieval card to receive information on all modems/multiplexers in this survey.

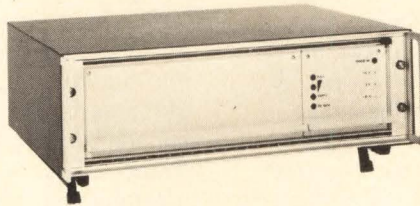
3 new products specifically designed for the data communications user —from ICC



40+ data display system

Adds plus features to your business communications.

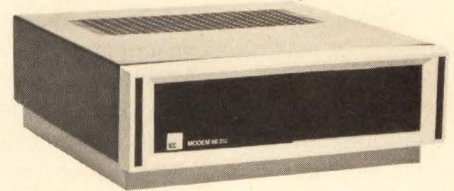
The ICC 40+ is a complete, versatile data display system. It's designed to deliver more accurate, more useful information at remote locations, with reduced processing and communication costs. The 40+ provides for the efficient entering, displaying, editing, printing, storing, sending and receiving of your business data. Now you can fill your data display needs with the same standard of reliability built into ICC modems.



COMSTORE 1032

Expands the flexibility of your communication facilities.

Comstore, ICC's highly versatile communications buffer store, helps you extend the effectiveness of your data communication system. Its wide capabilities include data storage, conversion between synchronous and asynchronous modes, and between ASCII and Baudot codes. With Comstore, you can increase or reduce data speeds. And its broad range of control and monitoring facilities allow data handling to be either automatic or operator-controlled. Comstore 1032 is the economical way to add flexibility to your data communication system.



MODEM 96 MULTI MODE

Helps cut the cost of high-speed data communication.

ICC's newest multiport modem puts 9600 bps transmission to work to reduce data communication cost. With Modem 96, you can cut line requirements by combining several medium-speed circuits over a single high-speed 9600 bps line. Its independent carrier control signaling on each channel allows it to handle polled networks as well as point-to-point communication. And diagnostic and monitoring features give you broader control over data network operation. Modem 96 is the reason to re-evaluate 9600 bps.



International Communications Corporation

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- ☐ 40+ Data Display System
- ☐ Comstore 1032
- ☐ Modem 96 Multi-mode
- ☐ Complete Product Line

Modems

Company	Model	Speed (bps)	Type	Line Type	Conditioning	Equalization	Comp. Bell	Purchase price	Circle No.
Anderson-Jacobson 1065 Morse Ave. Sunnyvale, CA 94068 (408) 734-4030	A242	450	Asynch	Voice	None	None	103	\$345	201
	A342	450	Asynch	Voice	None	None	103	\$395	202
	AD/AC 1200	1200	FM asynch	Voice	None	None	202	\$985	203
Astrocom Corp. 15012 Minnetonka Ind. Rd. Minnetonka, MN 55343 (612) 933-2208	320/324	2000/2400	PM synch	Voice	None	None	201A/B	\$1,600	204
	120	1800	FM asynch	Voice	None	None	202	\$245	205
	130	300	FM asynch	Voice	None	None	103A,	\$145	206
	548	4800	QAM synch	5002	None	Std	E, F, None	NA	207
	SC200/400	100k	PM synch	5002	None	Std	None	\$920	208
A.T. & T. 195 Broadway New York, NY 10007 (212) 393-9800	103A/E/G/H	300	FM asynch	Voice	None	None	113	NA	209
	103F	300	FM asynch	Voice	None	None	103F	NA	210
	113A	300	FM asynch	Voice	None	None	103	NA	211
	201A/B	2400	PM synch	Voice	C-2	None	201	NA	212
	202C/D/E	1800	FM asynch	Leased	C-1/C-2	None	202	NA	213
	203A/B/C	7200	AM synch	Voice	C-2	Std.	203	NA	214
	402C/D	600	FM asynch	Voice	C-1	None	402	NA	215
Bowmar/Ali 531 Main Street Acton, MA 02172 (617) 263-8361	6103A	300	FM asynch	Voice	None	None	103	\$600	216
	6000A	2400	PM synch	Voice	None	Std	None	\$1,250	217
Burroughs Burroughs Place Detroit, MI 48232 (313) 972-7084	TA783	1800	FM asynch	Voice	None	Std	202D	\$890	218
	TA734/24	2400	QAM synch	Voice	None	NA	201B	\$2,990	219
	TA733/48	4800	PM synch	Voice	C-1	NA	None	\$5,990	220
Codex 15 Riverdale Ave. Newton, MA 02195 (617) 969-0600	Series 4800	4800	QAM synch	Voice	None	Std	None	\$4,800	221
	7200 C	7200	QAM synch	Voice	C-2	Std	None	\$7,200	222
	9600 C	9600	QAM synch	3002	C-2	Std	None	\$9,700	223
	4830	4800	HD	Voice	None	None	None	NA	224
	4800	4800	QAM synch	3002	C-2	None	None	\$4,800	225
	4800 Int'l	4800	QAM synch	M102	C-2	None	None	\$4,800	226
Coherent Comm. Corp. 85D Hoffman La., South Central Islip, NY 11722 (516) 582-4044	TYM1/	150/	FM asynch	Voice	None	None	402	\$600	227
	DAM4	600							
	DAM4	1200	FM asynch	Voice	Na	Na	Na	\$498	228
Collins Radio Corp. 19700 Jamboree Blvd. Newport Beach, CA 92663 (714) 833-4600	DAM5	1800	FM asynch	3002	C-2	Std	NA	\$375	229
	TMX-202	1800	FM asynch	Voice	None	Opt	202D	\$470	230
ComData Corp. 7544 W. Oakton St. Niles, IL 60648 (312) 692-6107	TE-236	2400	PM synch	Voice	None	Std	201B	\$1,750	231
	Series 302	300	FM asynch	Voice	None	None	103, 113	\$245	232
Data Products 17 Amelia Place Stamford, CT (213) 325-4161	DataPak	1800	FM synch/asynch	3002	None	None	103F, 202D	\$350	233
Dataserv 770 Airport Blvd. Burlingame, CA 94010 (415) 342-0877	1340	300	FM asynch	Voice	None	None	103A	\$450	234
Design Elements 1356 Norton Ave. Columbus, OH 43212 (614) 294-2694	Design 76/80/88	300	FM asynch	Voice	None	None	103	NA	235
Digital Techniques 4248 Delemere Ct. Royal Oak, MI 48073 (313) 549-8663	3300	150	FM asynch	Voice	None	None	103	\$350	236
	2301	300	FM asynch	Voice	None	None	103	\$356	237

Company	Model	Speed (bps)	Type	Line Type	Condi- tioning	Equali- zation	Comp. Bell	Purchase price	Circle No.
Gen. DataComm 131 Danbury Rd. Wilton, CT 06837 (203) 762-0711	GDC 103	300	FM asynch	Voice	None	None	103	\$215	238
	GDC 101C/5	300	FM asynch	Voice	None	None	101C	NA	239
	GDC 106	300	FM asynch	Telex	None	None	None	NA	240
	GDC 108	300	PM synch	3002	None	None	108	NA	241
	GDC 113	300	FM asynch	Voice	None	None	113	NA	242
	GDC 201	2400	FM asynch	Voice	None	None	201	NA	243
	GDC 202	1800	FM asynch	Voice	None	None	202	\$365	244
	GDC 402	600	FM asynch	Voice	None	None	402	\$485	245
General Electric Mt. View Road Lynchburg, VA 24502 (804) 846-7311	1103	300	FM asynch	Voice	None	None	103, 113	NA	246
	330	9600	AM synch	3002	None	None	None	NA	247
	2201	2400	4 phase PM	Voice	C-2	Std	201B	NA	248
GTE Info. Systems Mt. Laurel Ind. Pk. Moorestown, NJ 08057 (609) 235-7300	IS2301	300	FSK asynch	Voice	None	None	103	\$350	249
	IS2302	300	FSK asynch	Voice	None	None	103	\$325	250
	IS2303	300	FSK asynch	Voice	None	None	103	\$350	251
	IS2304	300	FSK asynch	Voice	None	None	103	\$199/card	252
	IS2120	1200	FSK asynch	Voice	None	None	202	\$499	253
	IS2241	2400	FSK synch	Voice	None	None	201B	\$1,695	254
	IS2242	2400	FSK synch	Voice	None	None	201B	\$3,190	255
	IS2243	2400	FSK synch	Voice	None	None	201B	\$1,795	256
	IS2480	4800	AM synch	Voice	C-2	None	None	\$3,330	257
GTE Lenkurt 1105 County Road San Carlos, CA 94070 (415) 591-8461	25B/10B	300	FM asynch/	Voice	None	None	103	\$355	258
	26C	2400	FM asynch synch	Voice	C-1, 2	Std	None	\$1,700	259
	26D	4800	FM synch	Voice	C-2	Std	None	\$2,700	260
	26U	1200	FSK asynch	Voice	None	None	202C, D	NA	261
	261A	2400	FM synch	3002	C-1	None	None	NA	262
	262A	4800	DPSK synch	3002	None	None	208A	NA	263
ICC 8600 N.W. 41st St. Miami, FL 33166 (305) 592-7654	20 LSI	2000	4 phase PM	Voice	None	Statist.	201A	\$1,780	264
	24 LSI	2400	4 phase PM	Voice	None	Statist.	201B	\$1,780	265
	3300/36	3600	AM/PM synch	Voice	None	Statist.	None	\$3,620	266
	4500/48	4800	AM/VSB synch	3002	None	Auto.	None	\$4,980	267
	4600/48	4800	DDSK/AM synch	Voice	None	Man.	None	\$4,750	268
	4800/72	7200/4800	AM/VSB synch	Voice	C-1	Auto.	None	\$6,900	269
	COM-LINK II	19.2K	2 phase PM	Coax.	None	Man.	None	\$1,100	270
	1100	1M	2 phase PM	Coax.	None	Man.	None	\$2,300/2,800	271
	4700/48	4800	VSB synch	Voice	None	Auto.	None	\$5,200	272
	96 Multi- Mode	9600	QAM	Voice	C-2, D-1	Auto.	None	NA	273
	2200/20	2000	4 phase PM	Voice	None	Statist.	201A	\$1,780	274
	2200/24	2400	4 phase PM	Voice	None	Statist.	201B	\$1,780	275
	5500/96	9600	AM/PM, VSB	Voice	C-2	Auto.	None	\$9,750	276
Intertel 6 Vine Brook Park Burlington, MA 01803 (617) 273-0950	MCS1200	1200	FM	3002	None	None	202C, D	\$990	277
	MCS2000	2000	4 phase PM	3002	None	None	201A	\$1,750	278
	MCS2400	2400	4 phase PM	3002	None	None	201B	\$1,750	279
	MCS4800	4800	QAM synch	3002	None	None	None	\$4,700	280
	MCS7200	7200	QAM synch	3002	None	None	None	\$7,100	281
	MCS9600	9600	QAM synch	3002	None	None	None	\$9,700	282
Livermore Data 2050 Research Dr. Livermore, CA 94550 (415) 447-2252	71 Series	300	FM asynch	Voice	None	Std	103	\$235	283
	Classic	300	FM asynch	Voice	None	Std	103	\$250	284
	403	300	FM asynch	Voice	None	None	103A	\$550	285
	412	1200	FM asynch	Voice	None	None	None	\$580	286
	424	2400	FM synch	Voice	None	None	None	\$950	287
	448	4800	AM/PM	Voice	C-2, 4	Std	None	\$2,850	288
MI² Data Systems 1356 Norton Ave. Columbus, OH 43212 (614) 294-2694	76	300	FM asynch	Voice	None	None	101, 103	NA	289
	101CMR	300	FM asynch	Voice	None	None	101, 103	NA	290
	103C TH/GM	300	FM asynch	Voice	None	None	101, 103	NA	291
	113/87	300	FM asynch	Voice	None	None	101, 103, 113	NA	292
	1200	1200	FM asynch	Voice	None	Std	202C, D	NA	293
Novation 18664 Oxnard Tarzana, CA (213) 344-7191	DC 3102AD	300	Asynch	Voice	None	None	103	\$275	294
	3103AD	300	Asynch	Voice	None	None	103	\$395	295
	3104AD	300	Asynch	Voice	None	None	103	\$330	296
	ATMX	300	Asynch	Voice	None	None	103	\$450	297
	202	1800	Asynch	Voice	None	None	103	\$366	298
Paradyne Corp. 8550 Ulmerton Largo, FL 33540 (813) 536-4771	BISYNC-48	4800	AM synch	DDD	None	Auto	None	\$4,600	299
	M-48	4800	AM synch	Leased	None	Auto	None	\$3,000	300
	M-96	9600	AM synch	Leased	D-1	Auto	None	\$6,500	301



4800 bps

Penril's 4800B-1 offers outstanding performance over unconditioned lines with dial back-up—performance unaffected by changing line characteristics—single site equalization and special diagnostics.

Penril Modems

Exceptional Performance to 4800 bps



2400 bps

Six models available to meet your system requirements—offering: special low-cost polled system diagnostics, low speed reverse sync/async channels, and compatibility with the Bell 201 B and C Data Sets.



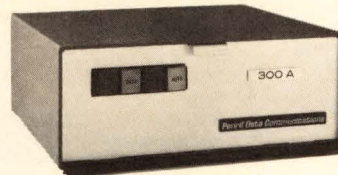
1800 bps

Penril's 1800B async modem is on-line compatible with the Bell 202 C and D Data Sets—dial operation to 1200 bps—synchronous model available operating at 150, 300, 600, 900, 1200, and 1800 bps over dial lines.



1200 bps

Two models operating half-duplex over dial lines or full-duplex with 5 bps or 150 bps reverse channels—feature automatic dial and answer capabilities—compatible with Bell 202C Data Set.



300 bps

Penril offers a complete line of 300 bps modems for operation in any system configuration—offering: auto-dial, auto-answer, special OEM Teletype model, and compatibility with Bell 100 Series Data Sets.

For complete product information write or call Penril Corp. or your area representative.

Penril
corp.

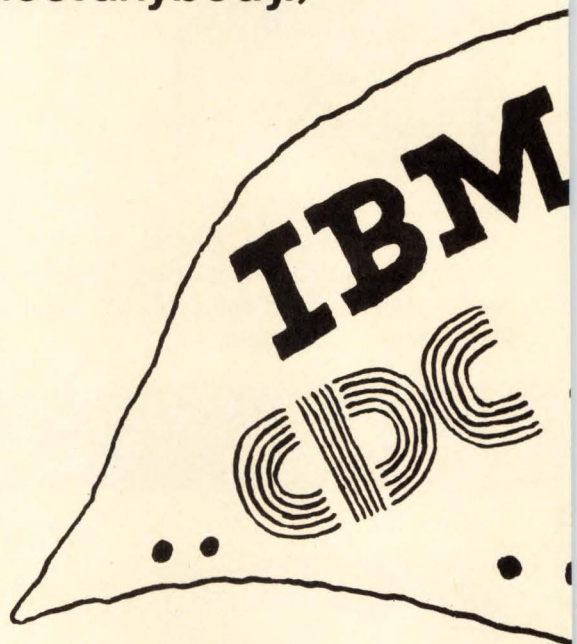
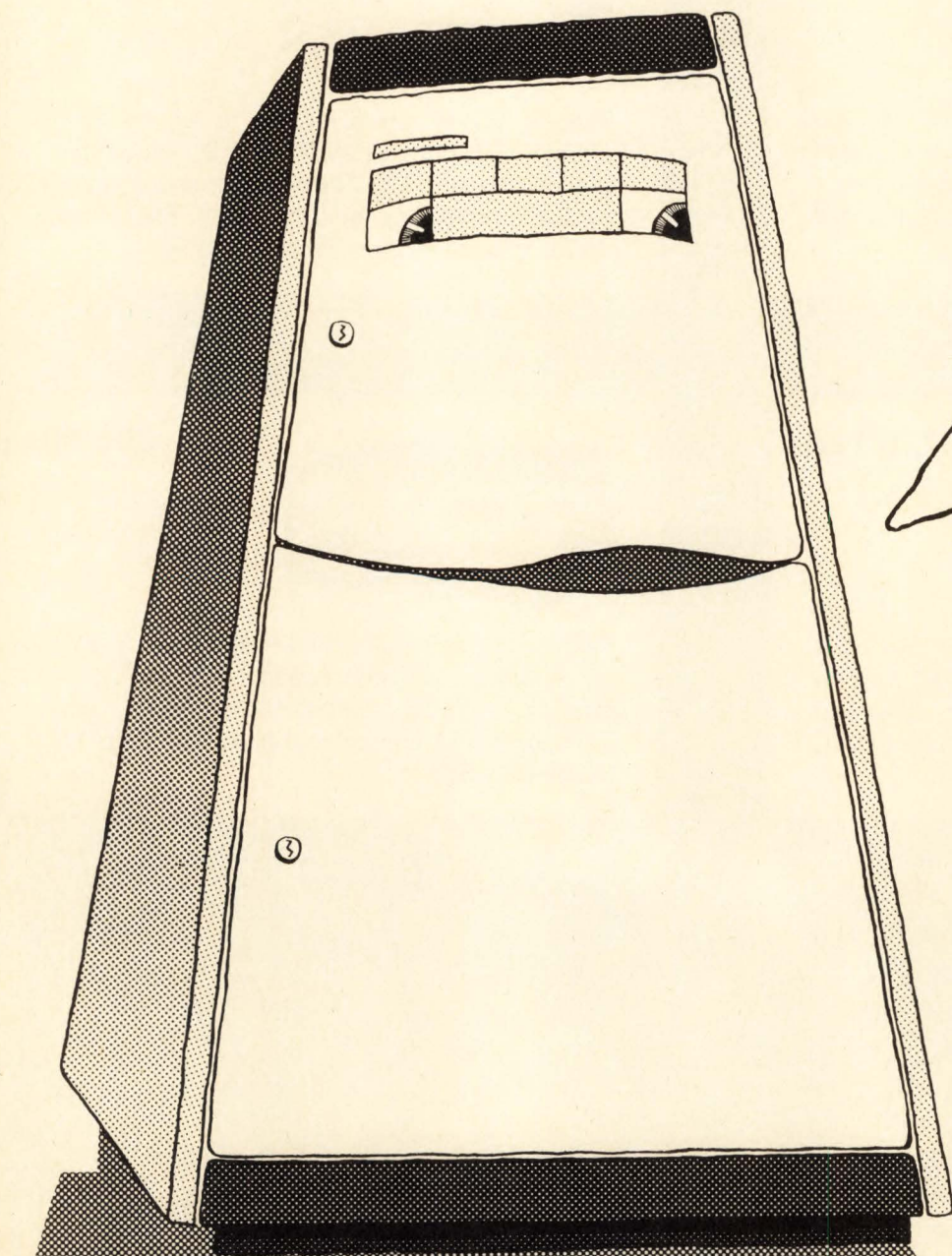
5520 RANDOLPH ROAD
ROCKVILLE, MARYLAND 20852
(301) 881-8151

Regional Offices: San Jose, California (408) 243-5761 • Northfield, Illinois (312) 441-6226 • Newton Centre, Massachusetts (617) 969-4075

Representative Offices: Connecticut (203) 453-5424 • Colorado (303) 771-6200 • Georgia (404) 963-9855 • Kansas (913) 362-2366 • Michigan (313) 354-6421 • Missouri (314) 938-4992 • North Carolina (704) 527-2536 • New Jersey (201) 673-2500 • Ohio (216) 585-8421 • Pennsylvania (215) 265-3450 • Texas (713) 686-9627 • Washington (206) 763-2755 • Canada, Gandalf Data Communications, Ltd. (613) 825-4526 • Europe, Computer Instrumentation, Ltd., England TELEX 47326

Linguist.

(Our front ends can talk to almost anybody.)



Our IS/1100 front ends can talk to most terminals, in almost anybody's system.

We've interfaced not only with IBM, but also XDS, CDC, Honeywell, Univac. And more are on the way.

And that's not all.

We support many enhancements to IBM front-end emulation, with no change in the host's access method.

Among these are multihosting, terminal routing and automatic baud rate detection, with full redundancy. And we support a full range of peripherals.

Our front ends can be custom-configured, too, to take the data communications load off the main

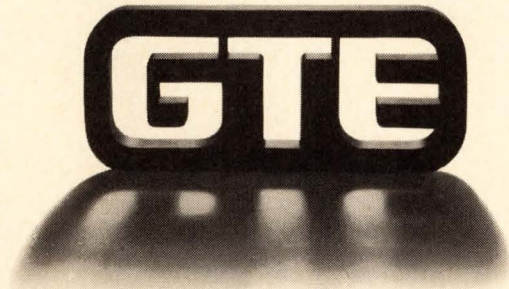
frame. This alone can save about 20% of the host's power.

Finally, because no one wants his \$2,000,000 computer shut down by a malfunctioning \$50,000 front end, remember that our products are backed by the GTE Information Systems service organization. With experts in cities all around the country.

What goes on between you and your computer is a lot of talk.

And we can talk to almost anybody.

GTE Information Systems: One Stamford Forum, Stamford, Conn. 06904. **Atlanta**, 404-688-1670; **Boston**, 617-237-5222; **Chicago**, 312-332-7800; **Cleveland**, 216-771-8455; **Dallas**, 214-741-4361; **Detroit**, 313-353-5494; **Hartford**, 203-563-3767; **Houston**, 713-626-1713; **Los Angeles**, 213-380-2309; **Minneapolis**, 612-854-2898; **New York**, 212-486-3290; **Philadelphia**, 215-649-7410; **Pittsburgh**, 412-391-4170; **St. Louis**, 314-863-0330; **San Francisco**, 415-349-2600; **Seattle**, 206-283-3103; **Washington**, 202-293-2800; **Montreal**, 514-866-9324; **Toronto**, 416-362-1541; **GTE/IS Europe S.A.**, 412 Ave de Tervuren, 1150 Brussels, Belgium.



Company	Model	Speed (bps)	Type	Line Type	Condi- tioning	Equali- zation	Comp. Bell	Purchase price	Circle No.
Penril Corp. 5520 Randolph Road Rockville, MD 20852 (301) 881-8151	1800B	1800	FM asynch	Voice	C-1, 2	NA	202D, R	\$470	302
	1800S	1800	FM asynch	3002	C-1, 2	NA	CDT coupler	\$545	303
	300A/F	300	FM asynch	Voice	None	Std	100 series	\$545/650	304
	313B	300	FM asynch	Voice	None	Std	113B, 103E	\$250	305
	2400B1	1200/2400	4 phase PM	Voice	C-2	Std	201B, C	\$1,475	306
	4800B1	4800	4 phase PM	Voice	C-2	Std	None	\$3,400	307
PhonPlex 789 Park Avenue Huntington, NY 11743 (516) 549-6215	DVM 2600M	2800	NA	Voice	NA	NA	NA	\$9,000	308
	DVM 1300	1333	NA	Voice	None	NA	NA	\$3,500	309
RFL Industries Powerville Road Boonton, NJ 07005 (201) 334-3100	6385	1200	FM asynch	Voice	None	None	202	\$240	310
	4604	2000	4 phase PM	Voice	None	None	201A	\$1,780	311
	5220	300	FM asynch	Voice	None	None	103, 113	\$245	312
	5105	300	FM asynch	Voice	None	None	103, 113	\$135	313
	32DT/DR	1200	FM asynch	3002	C-1	None	None	\$789/937	314
	3952	2400	4 phase PM	3002	C-2	None	201B	\$1,780	315
Rixon 2120 Industrial Pkwy. Silver Spring, MD 20904 (301) 622-2121	DS1800	1800	FSK asynch	Voice	None	Std	202	NA	316
	DS2400/ 2401	1200/ 2400	4 phase PM	Voice	C-1	Std	201B	NA	317
	DS9601	9600	AM synch	Voice	C-2	Auto	None	NA	318
	DS4801	2400/ 4800	AM synch	Voice	C-1, 2	Auto	None	NA	319
	DS300	300	FSK asynch	Voice	None	None	113A, B	NA	320
	T101CSC	200	FSK asynch	Voice	None	None	101C	NA	321
	T103GSB	300	FSK asynch	Voice	None	None	103	NA	322
	T202C/D	1800	FSK asynch	Voice	None	Std	202	NA	323
	TA201	2400	4 phase AM	Voice	None	Std	201A, B	NA	324
	T208A	4800	PM synch	Voice	None	Auto	208A	NA	325
	T208B	4800	AM synch	Voice	None	Auto	208B	NA	326
	T201C 2400		4 phase AM	Voice	None	Std	201C	NA	327
	T113B	300	FSK asynch	Voice	None	None	113B	NA	328
	T113ATS	300	FSK asynch	Voice	None	None	113A	NA	329
	T103F	300	FSK asynch	Voice	None	None	103	NA	330
Sanders Assoc. 95 Canal Street Nashua, NH 03060 (603) 885-5400	3A Series	300	FSK asynch	DDD	None	None	103, 113	NA	331
	12A Series	1200	FSK asynch/ synch	DDD	None	Statist.	202C, D	NA	332
	18A Series	1800	FSK asynch	Private	C-1	Statist.	202C, D	NA	333
	20S Series	2000	PSK synch	DDD	None	Statist.	None	NA	334
Singer Telesignal 250 Crossways Pk. Dr. Woodbury, NY 11797 (516) 921-9400	24S Series	2400	PSK synch	Private	C-2	Statist.	201B	NA	335
	883A	300	FM asynch	Voice	None	None	103	NA	336
Teledynamics Inc. 525 Virginia Drive Ft. Washington, PA 19034 (215) 643-3900	898A/D	1200/ 1800	FM asynch	Voice	None/ C-2	None	202C	NA	337
	7103F-LC- 1, 2, 3	300	FM asynch	Voice	None	None	103, 113	\$292	338
	7113A/B	300	FM asynch	Voice	None	None	103	\$110	339
	7202 D/E	1200/ 1800	FM asynch	3002	None/ C-2	None	NA	\$439	340
	7201 A/B	2000/ 2400	4 phase PM	3002	C-2	None	201A/B	\$895	341
	7208A	4800	8 phase PM	3002	NA	NA	NA	\$3,300	342
	7103G- LC-4	300	FM asynch	Voice	None	None	103A, G	\$387	343
	7202F	1200	FM synch	Voice	None	None	202C, D	\$250	344
Timeplex Inc. 65 Oak Street Norwood, NJ 07648 (201) 767-1650	7113B- LC-4	300	FM synch	Voice	None	None	113B	\$207	345
	103D	300	FSK asynch	Voice	None	None	103	\$185	346
Vadic Corp. 505 E. Middlefield Rd. Mtn. View, CA 94040 (415) 965-1620	202D	2000	FM synch	Voice	None	None	202	\$325	347
	VA300	300	FM asynch	Voice	None	None	103	NA	348
	VA1200	300	FM asynch	Voice	None	None	202	NA	349
	VA3400	1200	FM asynch/ synch	Voice	None	None	NA	NA	350

Something always goes rong.

And before you can fix it, you've got to find it.

That can be an absolute (expletive deleted).

So we've done two things to help you delete that particular expletive from your data communications system.

One, we've built system diagnostics into every time division multiplexer that goes out our door. So that when the inevitable does happen you can find it, and fix it, fast.

Two, we can give you the same diagnostics, only more so, in our new compact test set, the Infotester. So that when some other muxmaker's equipment starts speaking in strange tongues, you can find and fix that trouble, too.



Synchronous or asynchronous. 50 bps to 9600 bps. In five different test modes. For fifteen separate interface test points.

Our motives in helping you with other people's multiplexers and modems are not entirely pure.

For one thing, an Infotester costs about \$2,000. Which makes it a bargain for you, true, but still leaves a few dollars for us.

Also, we figure that once you've seen how well our \$2,000 diagnostics work with other people's equipment, you'll better appreciate the free diagnostics you get

with our own multiplexers.

Use the coupon to find out more.

With a deal like this, how can you go rong?

System diagnostics:
About \$2,000.
Or free.
Either way, a bargain.



Infotron Systems

INFOTRON SYSTEMS CORPORATION, 7300 N. CRESCENT BLVD., PENNSAUKEN, N.J. 08110 (609) 665-3864

Gentlemen:

☐ Tell me more about your time division multiplexers with the built-in diagnostics.

☐ Tell me more about Infotester.

Name _____ Title _____

Company _____

Address _____

City _____ State _____ Zip _____

INFORMATION RETRIEVAL NUMBER 47

Multiplexors

Company	Model	Type	Max channels	Max speed lo/hi (bps)	Network features	Purchase price	Circle No.
Codex 15 Riverdale Ave. Newton, MA 02195 (617) 969-0600	810	TDM-char	64 asynch FD	600/100k	Waystation	\$2,000	351
	880	TDM-bit	8 synch HFD	600/30k	P-P	\$3,000	352
Coherent 85D Hoffman La., South Central Islip, NY (516) 582-4044	FDMA	FDM	36 @ 50 bps	50/300	multidrop	\$600	353
	SPMA	FDM	8 asynch HD	2400/300	multidrop	NA	354
ComData 7544 W. Oakton St. Niles, IL 60648 (312) 677-3900	200	FDM	16 @ 75 bps	75/300	multi/cont.	\$720	355
Data Products 17 Amelia Place Stamford, CT (203) 325-4161	Datapak	FDM	25 @ 75 bps	75/none	multi/cont.	\$422-550	356
Data General Southboro, MA 01722 (617) 485-9100	Nova-4026	TDM-bit	16 @ 150 bps	110/600	multi/cont.	\$1,300	357
	Nova-4060	TDM-bit	64 @ 9600 bps	110/1600	multi/cont.	\$1,500	358
	Nova-4073	TDM-bit	4-64	110/9600	multi/cont.	\$2,500	359
Digital Comp 12 Industrial Road Fairfield, NJ 07006 (201) 575-9100	D-116	TDM-bit	16 asynch FD	110/19.2k	contention	\$3,500	360
DuraCom 7300 N. Crescent Blvd. Bldg. 13 Pennsauken, NJ 08110 (609) 662-7272	MTS-1000	TDM-char	12 synch FD	9600/567.6k	multidrop	\$13,000	361
	TKS-2000	TDM-hybrid	24 @ 56 bps	56k/1.54M	multidrop	\$12,000	362
Gen. DataComm 131 Danbury Road Wilton, CT 06897 (203) 762-0711	1100	FDM	35 @ 56 bps	600/600	contention	\$380	363
	1202	TDM-char	96 @ 37.5 bps	6000/40.8k	multi/cont.	\$2,000	364
	1251	TDM-char	96 @ 37.5 bps	6000/40.8k	multi/cont.	\$3,500	365
	1150	FDM	27 @ 56 bps	600/600	contention	\$444	366
GTE/IS 1 Stamford Forum Stanford, CT 06940 (203) 357-2000	8520	TDM-char	20 asynch FD	NA/9600	multidrop	\$3,980	367
	8521	TDM-char	54 asynch FD	NA/9600	multidrop	\$4,980	368
GTE Lenkurt 1105 County Road San Carlos, CA 94070 (415) 591-8461	Type 25C	FDM	25 asynch FD	600/600	multi/cont.	\$450	369
	Type 25D	FDM	8 asynch FD	200/300	multi/cont.	\$550	370
Harris 325 W. Hibiscus Melbourne, FL 32901 (305) 727-4000	Elec. 700	FDM	24 @ 75 bps	600/600	multi/cont.	\$447	371
Infotron 7300 N. Crescent Blvd. Pennsauken, NJ 08110 (609) 665-3864	Timeline 240	TDM-bit/char	162 asynch/synch	4800/240k	multi/cont.	\$3,000	372
Livermore 2050 Research Dr. Livermore, CA 94550 (415) 447-2252	ADS-660	TDM-bit	45 asynch FD	600/100k	multi/cont.	\$4,500	373
	ADS-670	TDM-char	128 asynch FD	300/9600	multi/cont.	\$2,500	374
	ADS-680	FDM	25 @ 75 bps	300/300	contention	\$570	375
Rixon 2120 Industrial Pkwy. Silver Spring, MD 20904 (301) 622-2121	TDX-4	TDM	4 @ 1200 bps	4800/9600	multidrop	NA	376

Company	Model	Type	Max channels	Max speed lo/hi (bps)	Network features	Purchase price	
Singer Telesignal 250 Crossways Pk. Dr. Woodbury, NY 11797 (516) 921-9400	2394	FDM	16 @ 110 bps	NA/NA	multidrop	NA	377
	2450	FDM	24 @ 75 bps	NA/NA	multidrop	NA	378
	2533	TDM-bit	76 @ 37.5 bps	300/4800	multidrop	NA	379
	2645A	FDM	12 @ 150 bps	NA/NA	multidrop	NA	380
	6024	FDM	24	200	multidrop	NA	381
Sonex 2337 Philmont Ave. Huntingdon Valley, PA 19006 (215) 947-6100	108	TDM-bit	8 @ 110 bps	1200/NA	NA	\$3,000	382
	116	TDM-bit	16 @ 110 bps	2400/NA	NA	\$5,000	383
Syntech 11810 Parklawn Dr. Rockville, MD 20852 (301) 770-0550	TTC-3000	TDM-bit	76 @ 110 bps	300/NA	contention	NA	384
Timeplex 65 Oak Street Norwood, NJ 07648 (201) 646-1155	Time-plexer T-4	TDM-char	20 @ 1200 bps	1200/25k	multi/cont.	\$1,175	385
	T-96	TDM-char	96 @ 600 bps	9600/64M	multi frontend	\$2,300	386
	MC-70	TDM-char	70 @ 50 bps	1200/9600	multi/cont.	\$5,200	387
	SMC-200	TDM-bit	32 synch FD	230.4k/6.5M	multidrop	\$5,200	388

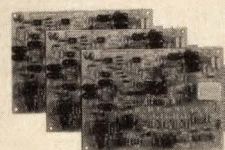
And the winnah . . .

The winner of the Hewlett-Packard 35 pocket calculator, which we gave away in conjunction with our June survey of computer accessories, is Manuel A. Glick of the United California Bank in Los Angeles. Mr. Glick is senior systems officer for the bank. He and his staff analyze and evaluate operations and make recommendations to help the bank function efficiently. One innovation they are considering is issuing pocket calculators to their loan officers in the field so they can do lengthy calculations in the customers' offices. ☐



Every bit counts

Who knows modems better than people who have specialized in communications for over 20 years! Modems, couplers, and FDMs of every type and speed are in the spectrum of communications systems and services made by people who long ago learned how to make every bit count. Taste a bit of problem-solving capability; use reader service card or call 215-643-3900.



ESPECIALLY MODEMS



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DIVISION OF **AMBAC**

525 Virginia Drive, Fort Washington, Pa. 19034 (215) 643-3900 TWX 510-661-0654



Enhanced 21MX series minis offer protection, storage to million words

Initially slated for the oem marketplace, enhanced models of the 21MX series minicomputers may accommodate monolithic memories of up to a million 16-bit words. The capability may be added to all existing 21MX machines via plug-in modules. The large memories are controlled via a mapping and protection unit which allows users to work in a 32k address space. Twenty-five instructions added to the microprogrammed cpu in conjunction with the memory expansion unit permit dynamic remapping of the address space over the entire physical memory. Read and/or write protection is part of the mapping process, which is handled in 1k chunks. The processor actually has four independent mapping "boxes," one for the system software, one for user software, and two for the dual-port channel controller. Thus, system access to 128k words of memory is permitted simultaneously. The 21MX enables system programs to control and oversee user-level use of the security hardware. End users will be able to purchase these systems shortly. The manufacturer indicates that work on software to simplify use of the memory enhancements is underway. Currently, users must manipulate the mapping hardware through assembly-language instructions. The processors, currently quoted in fifty-unit lots, go for \$17,358 with 65k words of memory, \$31,812 with 131k, and \$43,956 with 196k. Prices for other quantities and for memory sizes are available from the manufacturer. Deliveries are scheduled for February.

Hewlett Packard, 1501 Page Mill Rd., Palo Alto, CA 94304. (415) 493-1501.

CIRCLE NO. 121

Remote batch/RJE power from shared-processor data entry system

A remote job terminal that combines the functions of a 2780-type HASP workstation and simultaneous operation of a 3- to 8-keystation shared-processor data entry system has been announced by CMC. The 5780 is said to eliminate the need for punched cards, key-punches, and verifiers in production jobs. The 5780 is suited for applications where small-to-medium volumes of data originate at several locations and must be returned, after processing, to the point of origin for output printing. Typical examples are order entry, invoicing, and payroll for branch offices. The binary

synchronous communications controller for transmission rates up to 4800 baud; a printer controller and either a 115- or 300-lines-per-minute printer; a magnetic disk unit with storage capacity of 6000 112-character records; a 7-track, 556/800-bpi or a 9-track, 800-bpi magnetic tape unit. A standard 5780 also includes system programs; software for basic communications and data entry functions; three video keystations; and a KSR 33 teleprinter. The teleprinter is used for system control; statistical analysis of communications systems performance; and hard copy audit, status, and operator performance reports. Monthly rental for a standard system is \$965 with a 115-LPM printer and \$1145 with a 300-LPM printer. Corresponding purchase prices are \$36,800 and \$44,800. Available in fourth quarter.

Computer Machinery Corp., 2500 Walnut Ave., Marina del Rey, CA 90291. (213) 390-8411.

CIRCLE NO. 122

Xerox 800 word processor uses petal printer

The Xerox 800 electronic typing system is a word processing system for use in correspondence typing and general applications requiring extensive text-editing capabilities. The Xerox 800 system consists of two components, an electronic typewriter and a control console. The control console contains a microprocessor, magnetic tape cassette or magnetic card transports (for document memory), and the power supply for the entire system. Printing speeds of up to 350 words per minute are achieved in automatic typing. The printer, under microprogram control, will print while moving from left to right and from right to left in the automatic mode. It provides the capability of formatting text for 10 pitch, 12 pitch and proportional space printing. The printer utilizes an electronically positioned print wheel (88 characters on a wheel). Under control of the microprocessor, the carrier, print wheel, and platen can be positioned directly to any location on the paper from any other location, to place characters. Users can choose either the magnetic tape cassette or magnetic card recording media. Cassettes are available in either 150-foot or 300-foot lengths. A 300-foot tape cassette has a capacity of approximately 25 average-length letters, with reserve capacity for corrections. The magnetic card model, like the cassette unit, employs a single record/read head. Each of a card's 72 tracks has a capacity of 150 characters, for a total of 10,800 characters, the equivalent of a full legal-size page, together with retrieval information and correction capacity. Prices for the systems are: Model 122, single tape cassette, \$220 per month on a 1-year lease; model 124, single card unit, \$195 per month; model 124, dual card unit, \$280 per month; model 128, dual tape system, \$290. Installation charge is \$40. Print wheels are \$15.00 in units. Deliveries begin in November.

Xerox Corp., Xerox Square, Rochester, NY 14644 (716) 546-4500.

CIRCLE NO. 123

Spotlight New Developments

Small computers mix core, semiconductor memory

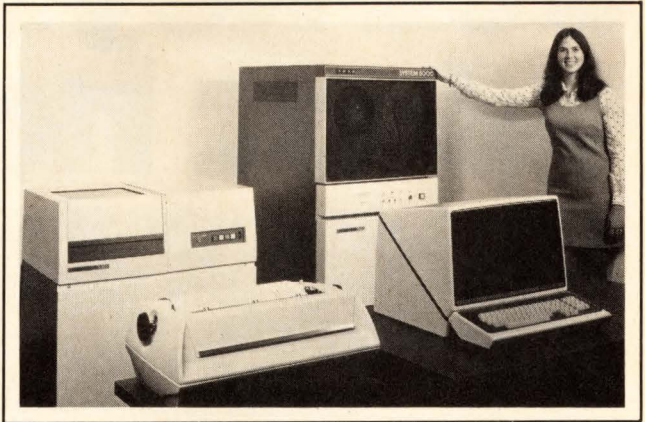
Incorporating user-oriented features usually found only in much larger computers, the first models of the Eclipse line, the S100 and S200, use a high speed micro-programmed central processor, and can run with either core or semiconductor memories, or both. The core and semiconductor memories are available with an error detection and correction feature that can find and correct single bit errors caused by the computer. The semiconductor memories use a high-speed cache to increase memory speed. The Eclipse S100, the smaller of the two computers, will be used by oems or by end users who need a smaller system to meet their requirements. The Eclipse S100 is 5-1/4 inches high, and holds six standard Data General printed circuit boards. It costs \$9200, with 16k bytes of core memory, and \$10,700 with 16k bytes of semiconductor memory. Eclipse S100 deliveries will begin in December. The Eclipse S200, a system-oriented computer that can hold 16 printed circuit boards, will be used by system builders or end users who will build large scale computing systems around it. The Eclipse S200 is 10-1/2 inches high, and costs \$16,300 with 32k bytes of core memory, and \$19,300 with 32k bytes of semiconductor memory. Deliveries of the Eclipse S200 will begin in February. The instruction set of both Eclipse computers is microprogrammed in the central processor. There are over 40 new instructions in the Eclipse computers. Programs written on Nova computers will run on either the Eclipse S100 or S200. The central processor includes a Writeable Control Store making up to 256, 56-bit words available to write specialized micro-programmed instructions. The instruction set is enhanced to help programmers writing in assembly language or high-level language programs. Hardware memory stacks, supported by comprehensive instructions, make programming more efficient, while block, word, byte and bit manipulation instructions improve system performance. Instructions are both single word and double word instructions.

Data General Corp., Route 9, Southboro, MA 01772. (617) 485-9100.

CIRCLE NO. 126

Computerized filing system stores up to one million records

The System 5000 computerized filing system is intended to replace costly and inefficient paper files, tub files, card files, tape files, film files and many computer files currently used in office environments. A single system can store up to 140 files containing a total of one million average-size records. Up to 32 operators can use the file simultaneously. Each can be performing a different task: Entering information, correcting it, changing it, searching through files or creating new files. The search feature enables records to be found in a file when only scant information—such as part of a number, or name—is known. Operators access the file using a terminal with a crt screen and keyboard. The terminal can be attached directly to the file, or communicate with it over telephone lines. Using simple two-letter commands an operator controls the performance of the file. The central files are stored



on up to four magnetic disks per system. Each disk can store 25-million characters of information. Comprehensive security features prevent unauthorized access or changes to any file or record, or part of any record within a file, to preserve confidentiality of information. A basic system consists of a control unit with a 64k mini, a magnetic tape drive for data logging and control; at least one 25-million byte disk storage unit, and at least one operator position. A small System 5000 with control unit, one disk, and two crts leases for \$1,878 a month on a three-year lease, or can be purchased for \$84,456. Larger systems, (32 stations and 100 million characters of storage) lease for up to \$8,000 per month.

Inforex, Inc., 21 North Ave., Burlington, MA 01803. (617) 272-6470.

CIRCLE NO. 127

Burroughs adds smart terminals featuring stand-alone power

The TC 3600 series, which includes four models, TC 600, TC 1600 and TC 2600 systems provide users with capabilities for online and local site processing. The TC 3600 magnetic record model features the use of an automatic feeder/stacker, a character keyboard buffer TC 3600 models have a 30-character per second console printer, which has a positioning speed of 330 character positions per second. Also featured is a 100-character per second photoelectric program loader. Applications programs may be entered through a data communication link, by a magnetic tape cassette subsystem, or peripheral devices with application program products written in *Cobol*. The TC 600, TC 1600 and TC 2600 models have data transmission speeds ranging from 600 to 1800 bits per second in asynchronous mode TC 3600 models provide a choice of asynchronous or synchronous modes, and data transmission speeds ranging from 75 to 9600 bits per second. Prices for basic TC 600, TC 1600 and TC 2600 models range from \$8,890 to \$15,090. Prices for the basic TC 3600 models range from \$15,500 to \$26,000. Deliveries of the TC 600 are scheduled for the fourth quarter. Deliveries of the TC 3600 models are scheduled for the fourth quarter of 1974.

Burroughs Corp., Burroughs Place, Detroit, MI 48232. (313) 972-7083.

CIRCLE NO. 128

Cut keystrokes by what happens to



SI
SYCOR INC.®

CORPORATE OFFICES: Ann Arbor, Michigan 48104 (313) 971-0900. **DISTRICT SALES OFFICES:** Atlanta (404) 457-1166 • Boston (617) 890-7290 • Chicago (312) 297-5200 • Cleveland (216) 831-8625 • Columbus (614) 888-8657 • Dallas (214) 521-6710 • Denver (303) 458-0794 • Detroit (313) 355-5770 • Greensboro, N.C. (919) 274-2964 • Hartford (203) 529-1100 • Houston (713) 688-5224 • Indianapolis (317) 784-6779 • Kansas City, Mo. (816) 842-7799 • Los Angeles (213) 640-0120 • Miami (305) 592-1533 • Milwaukee (414) 257-3780 • Minneapolis (612) 854-2309 • New York (212) 371-9050 • Philadelphia (609) 665-1170 • Pittsburgh (412) 922-3350 • Portland, Ore. (503) 227-5672 • San Francisco (415) 349-6626 • St. Louis (314) 878-0090 • Washington (703) 527-0200. **SERVICE CENTERS IN 80 CITIES.** CANADA: Sycor International Ltd., Toronto (416) 429-0883

50% and guess data entry costs?



Costs are reduced and so are errors. Use of Sycor's 340 intelligent terminal with dual flexible disk in a typical order entry application can, in fact, reduce keystrokes by 50%.

And fewer keystrokes means greater throughput with fewer operators and a sharp reduction in error rates.

Our Model 340 with dual flexible disk may be used to automatically retrieve the kind of data that an operator would normally have to key-in. These two

IBM-compatible diskettes put 500,000 "fill-in-the-blanks" characters

at your operator's fingertips. This new system

allows you to store customer, product/price and salesman files right where you need them most—at the source of the data.

And you can use it not only to retrieve data, but also to maintain and update files—even generate reports. And you can do it fast...because the Sycor flexible disk has the fastest access time in the business.

Hard disk, too. For larger file applications, our Model 340 with its new hard disk drive performs all the functions of the dual flexible disk

system, but with a capacity of 2½ million characters. All of which can extend your remote data base management capability into new cost-saving applications.

From the people who brought you intelligence.

This new concept of remote data base management wouldn't be possible without the intelligence of our Model 340 and its powerful TAL programming language.

The Sycor 340 and its wide variety of peripherals is part of the family of intelligent terminals that have made us the leader in the field. For more information, contact your nearby Sycor representative. He's got all the answers for reducing your data entry costs.

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San Diego, California 92106

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22 8.00

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TAX 5
TAX AMOUNT 9.08
SHIPPING CHARGES 1.27
TOTAL AMOUNT 192.00



SYCOR



Multiuser business system built around PDP-11

The Datasystem 535, a multiuser business system, is built around a PDP-11/40 minicomputer. The standard system configuration has 96k bytes of core memory, two 2.4 million byte removable data storage disks, commercial timesharing software, a DECwriter terminal, and provisions for the addition of up to three more terminals. It will also support a 300-line-per-minute line

printer, industry-compatible magnetic tape, and 2780-compatible communications. Typical applications include order processing, production control, and inventory control. An optional communications package permits the system to perform communication functions equivalent to the IBM 2780 communications unit. System prices start at \$54,000; initial deliveries begin in October.

Digital Equipment Corp.,
Maynard, MA 01754.
(617) 897-5111.

CIRCLE NO. 129

Monitoring system checks manufacturing productivity

This minicomputer based system continuously monitors and controls individual production operations. Known as Datacom, it consists of work station terminals that automatically collect production information from each individual machine, a central control unit, data

display and report printer. The system provides ongoing communication to assist the machine operators and information to keep foremen and supervisors on top of production rates. Purchase price is \$1,200/station. Delivery is four to five months.

Information Automation Co., 425 Park Ave., South, New York, NY 10016.

(212) 889-5533.

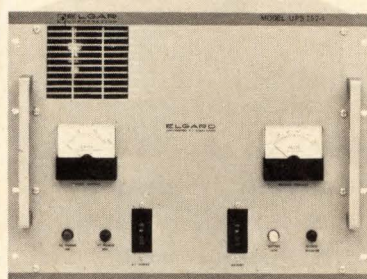
CIRCLE NO. 130

Mini-based mapping system is interactive

The Calma Interactive Mapping System enables a user to organize mapping information in a computer data base to suit almost any application, according to the firm. The user can then retrieve information selectively in the form of maps of various kinds. The system is a turn-key unit, using a mini for processing and control. The system accommodates up to four keyboard input stations and up to three automatic digital plotters, operating at the same time. The user can organize mapping information in categories and subcategories and, once entered and classified, can retrieve that information as a complete map with all features, or a select map depicting one or a number of categories and subcategories. The interactive mapping system, with input station, high speed plotter, a Data General Nova 2 minicomputer and associated peripherals, and complete operating software sells for \$130,000. Delivery is approximately 90 days aro.

Calmo Co., 707 Kifer Rd., Sunnyvale CA 94086.
(408) 245-7522.

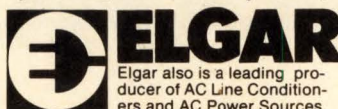
CIRCLE NO. 131



An Elgard UPS is for special occasions. (Like power failures.)

But don't wait for a power failure to buy one. Your computer may have already crashed, lost its memory, even partially destroyed itself. In the event of a complete power failure, the Elgard UPS takes over instantaneously to provide from 10 to 30 minutes or more of reserve power. It also continuously isolates sensitive electronics from line spikes and load transients. Elgard Uninterruptible Power Sources are available in 0.5 KVA to 30 KVA models. They supply 40db line transient reduction and $\pm 2\%$ voltage regulation.

For more information, contact Elgar Corporation, 8225 Mercury Court, San Diego, CA 92111. Phone (714) 565-1155.



Single step processing

The system 182 is a single step computer printout processor. The system can cut, select, sequence, fold, stack, staple, insert, and affix indentures and postage to a variety of printed output. System prices start at \$10,000.

Computer-Link Corp., 14 Cambridge St., Burlington, MA 01803.

CIRCLE NO. 132

Peripherals New Developments

Floating point system speeds Nova Fortran IV

The FPS faster Fortran IV is a system package based upon the FP-09 Floating-Point Processor. The FP-09, with stack-oriented command set, replaces software subroutine calls with hardware in-line code execution of *Fortran IV* floating-point REAL and COMPLEX arithmetic. It will perform a single or double precision REAL add in 6.7 μ s, compared to 102-152 μ s for software execution. Built on two Nova-compatible circuit cards, the FP-09 will plug inside any Nova series cpu. Run-time library software includes 94 scientific subroutines which use the floating-point hardware to provide fast computation of trigonometric and other math functions. FPS faster Fortran IV can be used on any Nova based system with teletype and 12k or more of core memory. It is priced at \$4,500 for the FP-09 plus \$500 for system software. Delivery is 60 days aro.

Floating Point Systems, 3160 S.W. 87th Ave., Portland, OR 97225. (503) 297-3318.

CIRCLE NO. 133

Buffered cassette recorder

The 8400 Datacassette features an MOS-type buffer, stores 145k characters per cassette, has switch-selectable speeds up to 2400 baud, and full remote control of all machine functions. Prices start at \$889 in oem quantities.

Techtran Industries, Inc., 580 Jefferson Rd., Rochester, NY 14623.

CIRCLE NO. 134

Floppy disk system supports HP DOS-M

The model HPC-420-2 dual drive floppy disk operating system (FDOS) is a random access, mass storage, hardware/software system for Hewlett-Packard 2100 series minicomputers whose key feature is the inclusion of the Dicom DOS-M system disk driver in the HP 24225 REV F version of DOS-M. The disk driver for the HPC-420-2 can operate with or without DMA, so it can be used with any HP 2100 series computer. A minimum system generated in 8k can have approximately 12600B words available. A basic system configuration is an HP 2100

mini, the HPC-420-2 FDOS and a console device. The HPC-420-2 costs \$4,900; delivery is 30 days aro.

Dicom Industries, 715 North Pastoria Ave., Sunnyvale, CA 94086. (408) 732-1060.

CIRCLE NO. 135

Plotter expands graphics of programmable calculators

The DP-1500 computer graphic output plotter is an intelligent computer-controlled drafting system with built-in data processing capabilities which allow programmable desk-top calculators to produce precision drawings. The DP-1500 is also a remote timeshare terminal. Standard and custom interface cards provide plug-to-plug compatibility with most programmable calculators, minicomputers, tape and disk memory units, and modems. The internal symbol generator can produce 55 different alphanumeric characters in response to standard ASCII codes. Other features include four limit switches that define allowable movements along the axes. Price of the DP-1500 is \$11,000. Delivery is 60-90 days aro.

Glaser Data Co., 225 Forest Ave., Palo Alto, CA 94301.

(415) 321-1348.

CIRCLE NO. 136

Expansion memory for MAC-16 minis

ExpandaMac-16 is an add-on memory system available in increments of 8,192 16-bit words, up to a maximum of 64k words. It duplicates the operating performance of standard MAC-16 minicomputer hardware. It uses core memory storage elements on plug-in memory boards; cycle time is one microsecond; and optional features include parity bits and memory protection. Price for the first 8k-memory module is \$4,225, which includes an enclosure capable of accommodating additional 8k memory increments up to maximum 64k capacity. Additional 8k memory modules are \$1,650 each. Available 45-60 days.

Cambridge Memories Inc., 12 Crosby Dr., Bedford, MA 01730.

(617) 271-6300.

CIRCLE NO. 137

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calling unit



The versatile

Timeplex Computer

Calling Unit saves you money by letting your computer do its own dialing over the switched network. It's an exact 801 replacement, or comes with an option to accept computer dial digit information in start-stop asynchronous character form from an RS 232 computer interface.

Use it for unattended polling of remote terminals or batch-processing depots during low-cost night or weekend hours. Or combine it with Timeplex TDM's and call several terminals simultaneously via a single leased line.

If you're using several lines, and calls are fairly long, an accessory Calling Line Selector lets one Computer Calling Unit efficiently service your entire system.

The CCU, available in card or stand alone versions, dials any number, including area codes and up to three PBX prefixes, and comes in either Touch-Tone or Dial-Pulse models. It works with any synchronous or asynchronous modems, at speeds from 50 bps to 4800 bps; a built-in 103 or 202 is available.

Use the Reader Service Card or contact us directly for information about the full line of Timeplex data communications equipment.

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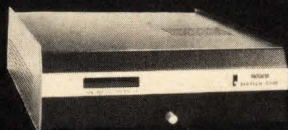
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301-770-0550

New Developments Peripherals

Remote data entry terminal comes in three models

The SPD 325 remote data entry terminal performs online data entry and processing tasks at remote terminal locations, and is available in either single- or dual-station configurations. Three models of SPD 325 terminal are offered. The models 1 and 2 offer 480- and 1920 character screens. Model 3 offers 960 character screen in an 80-column by 12-line format that is useful in applications in which key-punch-type data entry is significant. Other features include a 12-digit numeric pad in conventional adding machine configuration for arithmetic calculations; a data transfer speed of up to 9600 bits per second; a printing rate of 165 characters per second; and a series of options including constant screen image, field blink and numeric field lock-out. The system operates online with any IBM or other computer that can accept model 3275 interconnections. A dual-station configuration without printer is available for \$6,600, or

can be leased for \$78 per station per month on a five-year lease. Maintenance of \$25 per station per month is additional. Deliveries begin in October, 1974.

Incoterm Corp., 6 Strathmore Rd., Natick, MA 01760.
(617) 655-6100.

CIRCLE NO. 138

Paper tape reader

The iCOM model R8016P high speed paper tape reader will load the IMP-8P and 16P assembler in less than two minutes. The unit costs \$995.

iCOM, Inc., 6741 Variel Ave., Canoga Park, CA 91303.

CIRCLE NO. 139

More memory for Varian

This 16,384 word core memory module for Varian V70 series computer is a single port, asynchronous memory using low drive core and 16k sense. Price: \$3,250.

Varian Data Machines, 2722 Michelson Dr., Irvine, CA 92664.

CIRCLE NO. 140

THE COMPUTER PERFORMANCE EVALUATION MARKET

Sales of computer performance hardware monitors, software monitors, simulation software packages and services for evaluating computer systems, \$13 million in 1972, will reach \$60 million by 1977 and total \$140 million by 1983!

Although a small number of companies have entered the CPE field, it appears wide-open for independent software houses, data processing consulting firms and hardware testing manufacturers.

Frost & Sullivan has completed an unprecedented 190-page report which forecasts the market through 1983 for large and small hardware monitors, software monitors, simulation software packages and for consulting services for evaluating computer systems. Projections are in numbers, dollars and unit costs.

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ADVERTISERS INDEX

American Telephone & Telegraph Co.	18, 19
Artronix	63
Basic Timesharing, Inc.	9
*Census	16D
ComData Corporation	64
Cummins-Allison Corp.	7
Data General Corp.	4, 5
Digital Equipment Corporation	14, 15, 82, 29
Eastman Kodak Company	23
Elgar Corporation	54
Frost & Sullivan, Inc.	56
G.T.E. Information Systems	44, 45
Hayden Book Company	47
Hewlett-Packard	Cover II
Infotron Systems Corp.	66
International Communications Corporation	40
Itel Corp./DPG	21
Lockheed Electronics Co./LEC West	11
Optical Scanning Corporation	13
Penril	43
*Pertec Corporation	16A
Power Systems & Controls, Inc.	56
Raytheon Service Company	Cover III
Reader Service	64A, B
Rixon, Inc.	38
Survey Card	48A, B
Sycor, Inc.	52, 53
Syntech Corp.	56
*Techtran Industries	16B, C
Tele-Dynamics, Division of AMBAC	48
Termiflex Corporation	58
Texas Instruments, Inc.	Cover IV
Timeplex, Inc.	55, 57, 58
TWA Air Freight	33
Varian Data Machines	31, 36, 37
Xerox Corporation	3
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Data Comm

Telex interface fits any terminal, line

This custom-built Telex interface, series 10006 can be used with any type of terminal or line. It can be configured for use with single or multiline arrangements to allow almost any telecommunication system to be compatible with the Telex line. A terminal card meets standard line signaling criteria, and a 20 character programmable answerback can be provided for systems which do not meet the Telex system answerback requirements. The standard unit prices start at \$2,000. This includes such features as transmission speed of 50 baud, loop current of 20 MA, programmable start of number and end of number, and acceptance of all dial numbers simultaneously.

NuData Corp., 32 Fairview Ave., Little Silver, NJ 07739.
(201) 842-5757.

CIRCLE NO. 142

Channel adapter for data communications

The Austron 8001 Channel Adapter is designed for data communications and interfaces with either minicomputers or hard wired controllers, providing the channel interface is standard on all IBM peripherals. The single or multibyte transfer mode uses a one sequence buffer to free the minicomputer of channel timing demands. The 8001 adapter is programmable to accept or reject any multiplexer channel address from 0 to 255 and to accept or reject different commands on the multiplex channel. Price is \$8,500.

Austron Inc., 1915 Kramer Lane, Austin, TX 78758.
(512) 836-3523.

CIRCLE NO. 143

D-116 communications option

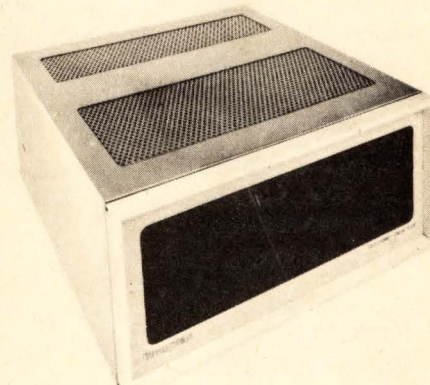
A communications option for the Digital Computer D-116 mini contains four fully synchronous channels. An internal clock allows speeds of up to 153.6k baud; external clocking allows speeds up to 250k baud. The 116475 can also be used with any Nova mini. A four channel unit costs \$2,075.

Digital Computer Controls, Inc., 12 Industrial Rd., Fairfield, NJ 07060.

CIRCLE NO. 144

You love our
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our port
concentrator.

**Greater flexibility,
lower cost.**



You already know that our Timeplexer saves money by transmitting multiple data streams over one line. Our C-32 Data Channel Concentrator adds to your savings by letting 16 (or fewer) computer ports serve up to 32 part-time local or remote inputs . . . such as modems, terminals, or multiplexer channels. Use the C-32 for synchronous or asynchronous data at rates from DC to 9.6 Kbps.

The C-32 is flexible. Using its switches or strapping, operation can be field-modified so that groups of inputs can be routed only to certain outputs, while other inputs reach some or all outputs, as desired. Inputs may be busied out manually; outputs may be busied out manually or remotely.

For greater capability, C-32s can be combined so that 64 or more inputs contend for the same 16 outputs. Or, our Channel Contention Expander can provide much of this added capability at lower cost.

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. . . mux makers and more.

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Phone (201) 646-1155,
TWX 710-991-9759.

Storage protection system for users of CICS

STOP is a storage protection system for users of *CICS*. It will provide the *CICS* user with the online testing and debugging facility in his new programming development activities by letting the user execute tests within a productions system and still maintain system stability. *STOP* controls application programs and prevents them from changing the contents of forbidden registers, areas in core, and from executing a branch to an area outside the programs code. Price is \$4,000.

On-Line Software Inc., 411 Hackensack Ave., Hackensack, NJ 07601. (201) 489-0400.

CIRCLE NO. 145

New language for Sycor 250 system

Field Instruction Language (FIL) consists of fill-in-the-blanks formats and general-purpose logical expres-

sions which augment existing screen formats including those generated by such preprogrammed packages as *CICS*, *IMS*, *TSO* and *Video 370*. Error-checking programs are created on the terminal screen and stored as source statements in the cpu files. Data may then be retrieved from the cpu and loaded into the display station under control of a built-in assembler. The Sycor 250 hardware is plug-for-plug interchangeable with remote IBM 3270 stand-alone terminals and cluster systems. No charge.

Sycor Inc., 100 Phoenix Dr., Ann Arbor, MI 48104. (313) 971-0900.

CIRCLE NO. 146

Management security system reveals new strengths

Version 8 of *Panvalet* is a program management and security system featuring increased library compression, a paper-saving option, editing capabilities, a read-only access sys-

tem, improved *Cobol* formatting compared to earlier versions. For a programmer's function, columnar updating and level stamping have been added to the system. Price of *Panvalet DOS* (per site) is \$4,980; *Panvalet OS* (per site) is \$5,580; and \$3,000 for time-sharing option.

Pansophic Systems Inc., 1301 W. 22nd St., Oak Brook, IL 60521. (312) 325-9600.

CIRCLE NO. 147

The bounding main

Navigation Pac I contains 26 different programs which enable navigators to perform calculations in minutes. Programs included in *Pac I* are Long Term Aries Almanac, Long Term Star Almanac, Sight Reduction Table and Maneuvering Relative to Another Vessel. *Pac I* sells for \$45, and is used with the HP 65 calculator.

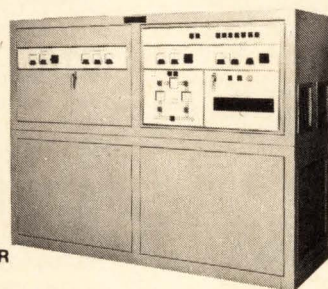
Hewlett-Packard, 1501 Page Mill Rd., Palo Alto, CA 94304.

CIRCLE NO. 148

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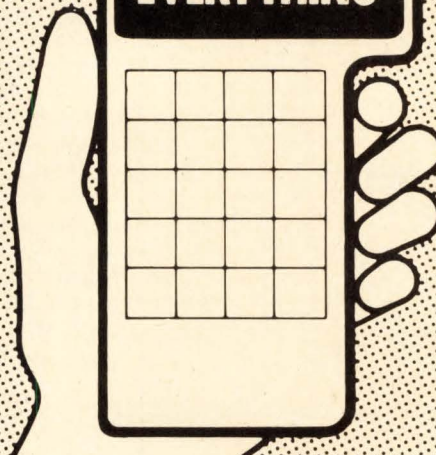
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Termiflex

NEWSDATA...

... from page seven

the mid-1950s. Exact location and use of each balance—down to the department, room and person in charge of it—is listed.

Every month the computer prints out 3,000 to 5,000 personalized letters. Two types are written: One informs the user that the balance is due for service under a maintenance agreement and that the Mettler representative will call on a certain date. The other tells the customer that Mettler is aware he possesses a balance, that the serviceman will be in the area, and that it's a good idea to schedule a preventive maintenance visit.

Both letters also ask the users for purchase orders, which later become the sources of computerized invoices.

According to David E. Mooney, EDP manager, the service letters could not be written without the computer. And, while there are no figures as to how much business the letters generate, Mooney says that "two weeks after the letters are sent out the service department gets a tremendous response."

The same system that has stimulated Mettler's maintenance program also helps management determine the company's penetration into specific markets by printing out the geographic location of balances, broken down into any or all nine usage classifications.

A more important function of the computer: It enables Mettler to offer its 25,000-odd domestic customers a carefully set up service schedule. Most of the instruments, which range in price from \$665 to \$70,000, are used in laboratories, where they are vital to research processes. The planned maintenance program is just as important to the users as to the company.

Mettler sells its balances through seven nationally known laboratory supply dealers. The dealers, who also market medical and scientific equipment, stock 40 to 50 different balance types at a time.

When an instrument is sold, its attached prenumbered warranty card is returned to Princeton by either the dealer or the buyer. Since return of the card ensures the user of one year's free warranty service, Mettler gets an 80% return.

It is this card that serves as the source of data for the computerized maintenance program. When the card

is received, it is coded according to its use into one of nine categories.

The information is keypunched onto a card for entry into the computer. Each customer is assigned an eight-digit identification number. The first five digits are the customer's zip code, and the last three identify the customer.

The computer file is organized in customer-number order. If the balance is a first-time sale, the new account is added to the customer master file, while the information on the balance is incorporated into the instrument file. Repeat sales are added to the instrument file only.

Each month the computer prints a report listing all balances on file. The report is sent to the service department, which writes in such variables as the month a service representative is scheduled into the area, area code, zone (indicating whether the serviceman has to remain overnight), rate code, class (scheduled maintenance, non-scheduled maintenance).

After the variables are entered, the computer, by analyzing the data and class codes, determines which users are due for letters and the type of correspondence each should receive. The letters are printed 60 days before the service representatives' visits.

Promotion letters are sent to each customer at least twice a year, although the number of service calls varies from one to four annually, depending on the amount of use the balance gets.

Cancer patients' histories analyzed by computer

A doctor in the small central California farming community of Visalia is using a computer to analyze the histories of cancer patients and track the treatments they receive.

Dr. Donald McGrew, pathologist at Kaweah Delta District Hospital, has stored the case histories of more than 1,700 cancer patients in the IBM System/3 model 6 computer.

It can provide his laboratory with a full report on individual patients, listing background, diagnosis, treatment and current condition. For an overall picture, the computer prints a summary report by subject, detailing all patients who have received surgery, for instance, or all who have had skin cancer.

Every case of cancer in the Visalia area is reviewed by the regional tumor board, a group of doctors who meet weekly and recommend courses of treatment. The board checks up on



The Timeplexer outsells all other multiplexers

The reasons are many:

It gives top performance at low prices, thanks to a unique memory design which reduces the circuitry required. Reliability is up, cost is down. Programming is simple and quick: merely change the jumpers.

The Timeplexer offers an unequalled range of options: units from 4 to 96 channels, adaptive speed, built-in modems, intercity contention, broadband interface, redundant logic and power, and multiline hubbing. It offers virtually unlimited combinations of speed, code, and parity ... synchronous and asynchronous.

In addition to multiplexing, the Timeplexer is a test center for your entire communications system. It has test switches and indicator lamps so that any source of failure — modem, multiplexer, terminal, line, or computer — is pinpointed.

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each patient yearly, asking the attending physician for a report on the current state of the disease and the most recent forms of treatment. The information is used to update the patient's file in the computer.

"The follow-up letter helps us determine what methods have been most successful in treating similar tumors," Dr. McGrew said.

"We're strengthening opinion in the medical community that chemotherapy is far more effective in many cases than surgery or irradiation treatment," he noted. Chemotherapy, or treating cancer with drugs, is among the newer methods of fighting the disease.

"Historical information from the IBM system has reinforced medical beliefs that malignant melanoma occurs more frequently in hot areas," Dr. McGrew said. Many cases of malignant melanoma, a cancerous condition of a mole, have been treated in Tulare county, where Visalia is located. Summer temperatures in the county often soar to more than 100 degrees.

Dr. McGrew also uses the computer to track the more than 13,000 Pap tests his pathology lab performs yearly. The tests are designed to detect cervical cancer in the early stages, when the cure rate is almost 100 percent. His wife Carol, who operates the computer, sends the results of normal Pap tests directly to the patients. Abnormal findings are sent to the doctors only, so they can call in their patients for further consultation.

Another use for the computer: It gives patients a quick medical report, to keep them from worrying, and saves the doctors from having to answer 13,000 phone calls a year from patients seeking results of the exams.

Hotel chain links with rapid reserve system

Want to reserve a room in a Ramada Inn in New York? In Chicago? You can do it now in a flash, using Ramada Inns' newly installed nationwide computerized reservation system.

The new system, called INFO 2001, is the result of two years' combined efforts by Ramada, Courier Terminals, Inc., Digital Equipment Corp. and Texas Instruments. Ramada expects to offer the system to other hotel chains.

Here's how it works: You can enter a reservation at any of the hundreds of Ramada Inns, each of which now has a TI terminal, linked to a pair of DEC 10s in Phoenix via a TI concen-

trator in Omaha. The computer will make two copies of your reservation; one will be given to you and the other will be received by the terminal in the hotel you've chosen.

If you'd rather phone, you can call the Ramada reservation center in Omaha, toll free. One of 70-odd operators will enter your request into the system through Courier terminals.

In addition to handling reservations, the individual terminals will be used for many on-site functions, such as payroll, night auditing, accounts payable and receivable.

Cost of each hotel-based terminal is about \$4,000, the major expense in adding a new hotel to the system.

All together now: O, solar mio

Some time in December, a nice, average family will move into a nice, average, four-bedroom house in Columbus, OH. That is, of course, if it's average to live with a computer in the garage that counts the number of times the doors are opened and closed.

The house also has 37 solar panels on the roof—not exactly average. And, far from routine, the fuel bills will probably be about 25% of normal.

This is the house that Homewood Corp. built to show that using the sun's energy for heating and cooling homes is not a far-out dream. The house was on display at the Ohio State Fair this summer and is now being used as a field test laboratory by Ohio State University.

Once the test family is in residence, the computer, an IBM System 7, will take readings every 15 minutes, collecting data such as weather, temperatures of the ground, attic, crawl spaces and slab; heat flow through walls, wind direction and speed. The test, supported by the National Science Foundation, is expected to continue for two to three years. Final results will give the developers the data needed to build the most practical solar home.

Here's how the sun's energy is harnessed: Heat from the solar panels, each 3 by 6½ feet, warms an anti-freeze-water solution which runs through flat-plate energy collectors under the panels.

This hot fluid, 160 to 200 degrees F., is stored in two 2,000-gallon tanks in the garage. From there it is pumped into the home to heat the water and warm the air for a forced-air system. Through a conventional heat-exchange system the hot fluid also provides air conditioning.

Homewood says it can market solar homes within two years, provided that no major problems develop during the test. Houses are expected to sell in the \$30,000-\$50,000 price range.

French computer thrives despite odds

The European computing stage is littered with fallen stars, many of them French—Citel, Metra International, Premateur, to name three recent casualties. Why French? To some extent the answer must be the naked industrial chauvinism popularized by the General and continued by his successors, to the everlasting annoyance of American multinationals.

Call a computer French, add a sprinkling of French backers, some unequivocally Gallic finance, and no matter how crackpot the machine may be, it will be hailed by the government's Delegation a l'Informatique as the greatest example of native technological prowess since the Eiffel Tower.

The latest example is a company called Alvan, a computer manufacturer without a manufacturing plant. The firm's product is in fact of American design, with a 16k main memory which is not quite a main memory as we know it. In spite of this, the system is tabbed as a "large-scale French dialogue processor." It sounds like a recipe for disaster, but thanks to the ingenuity of the brothers Gerbert (Alain and Ivan), Alvan seems to be thriving.

The Alvan computer was designed, ostensibly, by brother Alain, who is employed by Systems Integration Associates of Philadelphia. Brother Ivan, who worked for Compagnie des Signaux et Entreprises Electriques (CSEE) in France, was fired by Alain's enthusiasm for a 1969 SIA concept involving the tailoring of systems architecture directly to intended applications. Alvan was born.

The concept relies on an MOS cpu addressing a 512k Diablo fixed-head disk memory. The machine is completed by a keyboard and screen, magtape encoders and a printer. Fifty micro-coded functions—each corresponding to several hundred programming instructions—are incorporated within the system to eliminate the need for procedural languages, compilation and addressing by location. Users should easily be able to write new programs. For further programming, a language closely resembling APL is provided. The proc-

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essor is most likely a standard Intel unit with a bit of original interfacing hardware.

The clearly American ancestry of this curious machine has been overlooked in the excitement over the fact that it was apparently thought up by a Frenchman. The Gerberts are currently restricting sales to France, where assembly from largely imported components is subcontracted to—yes—CSSE.

The company's capital has doubled in 12 months as prestigious French banking groups have bought into the act, and the order book has some 80 firm entries from equally prestigious French customers. In an interview recently, Ivan Gerbert forecast orders for 2000 systems by the end of 1976. By mid-1975 Alvan intends to have 12-15 agents around France to cover the national market, and opening up of export markets seems only a matter of time.

With the average price of a system about \$30,000 in direct purchasing terms or \$650 monthly rental, and maintenance costs pegged at \$150 a month, Alvan seems to be a success in spite of the apparent odds against it.

Automation makes Sparks fly faster

When the city of Sparks, NV, installed a computer back in the late '60s, the city fathers' only plan was to automate the budget procedures that had earned statewide approval.

But Sparks is a fast-growing city—30,000 at present—and the officials soon found they had to assign more jobs to the IBM System/3 model 10 to continue providing good service to the residents.

Now, in addition to the biggest task, the budget report, the computer also runs a program of vehicle maintenance, overseeing more than 200 city cars and trucks. The machine indicates when each vehicle needs an oil change, grease job or tire rotation; keeps track of maintenance work being done; reports when a particular type of repair occurs too often, and plans for replacement when operating costs get too high.

Another job: Swift, accurate billing of the quarterly sewer assessment, which involves 9,000 hookups.

One feature of the weekly budget report is especially helpful in saving the city council from shopping shock—suddenly discovering it has to find funds to replace police cars or fire trucks. The computer keeps track of capital equipment depreciation and

automatically sets aside funds to replace equipment as it wears out.

The budget program also helps city manager John A. MacIntyre exercise careful control over city departments' use of their funds. If a department doesn't spend all it is budgeted for, the excess is returned to the city, unless MacIntyre approves carryover.

The computer will soon get a new job, a property information system that will provide a profile of every parcel of land in Sparks. It will include data on building codes, easements and right-of-way, tax assessments, even access to fire hydrants.

It's not Superman, It's Super-letter

Is it a bird? A plane? No, and not Superman, either. It's a new speed-of-light combination telegram and letter, the Mailgram, sent by satellite for the first time from East Coast to West.

Guaranteed to provide a reliable, efficient and economic way of moving the mail, Mailgram messages were sent last month, via WU's Westar I, from Glenwood, NJ, to Steele Valley, CA., and from there to a U.S. post office in Los Angeles for regular delivery.

Although Mailgram service was introduced four years ago, with the U.S. Postal Service and WU as joint sponsors, this was the first time the messages went by satellite. Regular New York to LA Mailgram Westar service was to begin in late September, to be followed by traffic from the East Coast to Texas and other parts of the West Coast at the end of the year.

Delivered in distinctive blue-and-white envelopes, Mailgrams are attention-getting, like telegrams, but much cheaper—\$2 for a 100-word, phone-originated Mailgram and 70 cents for a computer-originated message.

The general public can send Mailgrams by calling toll-free numbers; businessmen can send them on the Telex, rwx and InfoCom teleprinters. High-volume users can put their lists on computer tape for transmission.

Weatherman gets help from worldwide code

The weatherman, object of scorn and derision when he doesn't call it right, is getting a computerized assist

in making more accurate predictions.

Help comes in the form of groups of five-digit numbers, numerical representations of the world's weather, transmitted by 5,000 ships, aircraft, land stations, satellites and automatic weather buoys and relayed through a network of computers around the world.

Each day millions of sets of numbers are received by Control Data computers, such as the one at the Navy's Fleet Numerical Weather Central at Monterey, CA. The computers sort, integrate, store the information, then compare results with data accumulated the previous day.

The idea of reducing the world's weather to numerics is credited to John von Neumann, who developed the technique at Princeton University in 1946. The idea could not be put to practical use until the development of the modern computer.

The Navy's interest in numerical weather forecasting began in 1958, when it purchased the first computer built by Control Data—the CDC 1604. This computer, advanced as it was for its time, was superseded by others capable of processing information 18 times faster.

Actually, weather observations are still based largely on information obtained from two instruments developed more than 300 years ago—the thermometer, invented by Galileo in 1592, and the barometer, developed in 1643 by his pupil, Torricelli. By measuring temperature and barometric pressure, an observer can derive other weather components, such as moisture content and wind.

Accurate weather forecasting depends on the rapid accumulation of sufficient data, as well as the ability to transmit the data quickly. The development of numeric coding and the scattering of computers around the world accomplishes this. Weather observers send their information to computers in Canada, France, Germany, Austria, Czechoslovakia and Spain, to be processed into the five-digit code. Each computer then sends its data to the others, without the need for translation into different languages.

The basic principle of numeric coding of weather information is simple. For example, the first five-digit group in a transmission identifies the sender and his location. The first digit of the next set of numbers indicates what fraction of the sky is covered with clouds. The next two numbers give wind direction, and the last two numbers, wind speed. Other code groups provide additional details such as temperature and pressure.

But the numbers tell only what the weather is like at a given point on

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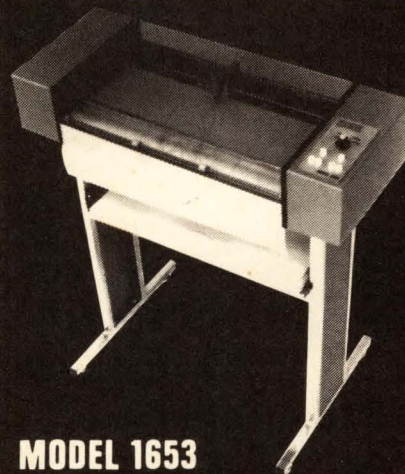
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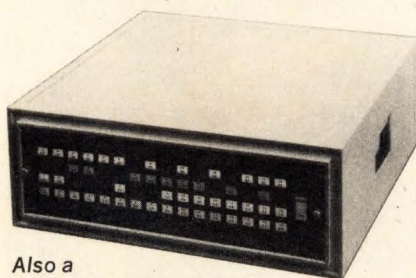
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Product Index

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number. For more information, check the Reader Service No. on the card opposite.

CATEGORY	RSN	Page	CATEGORY	RSN	Page
DATA COMM			SOFTWARE		
calling unit	55	55	HP 65 programs	148	58
channel adapter	143	57	management security	147	58
communications option	144	57	operating system, mini	37	37
concentrator	59	59	storage protection	145	58
front-end	45	45	terminal language, Sycor	146	58
multiplexer	142	57			
Telex interface	47, 49	47, 57	SURVEY		
modems	13, 39, 40,	13, 38,	modems		39
	43, 48, 62	40, 43,	multiplexers		47
		48, 62			
LITERATURE			SYSTEMS		
software monitors, report on	56	56	business system, minibased	129	54
			COM	23	23
PERIPHERALS			data entry	7, 53	7, 53
cassette recorder	17, 134	16C, 55	disk/tapes, Univac-		
disk drive	16	16A	compatible	122, 123, 124, 125	50
floating point, Nova	133	55	education system	3	3
floppy disk	135	55	filing system	127	51
memory, add-on, Varian	140	56	mapping system	131	54
memory, add-on, MAC-16	137	55	minicomputers	5, 15, 93,	5, 15,
optical reader	64	64		121, 126	Cover IV,
paper tape reader	139	56			50, 51
plotter	31, 136	31, 55	monitoring system	130	54
terminal, data entry	138	56	printout processor	132	54
terminal, hand-held	60	58	terminal, intelligent	128	51
			timesharing system	9, 91	9,
SERVICES					Cover II
air freight	33	33	turnkey	11	11
leasing	21	21	UPS	54, 58	54, 58
computer	92	Cover III			

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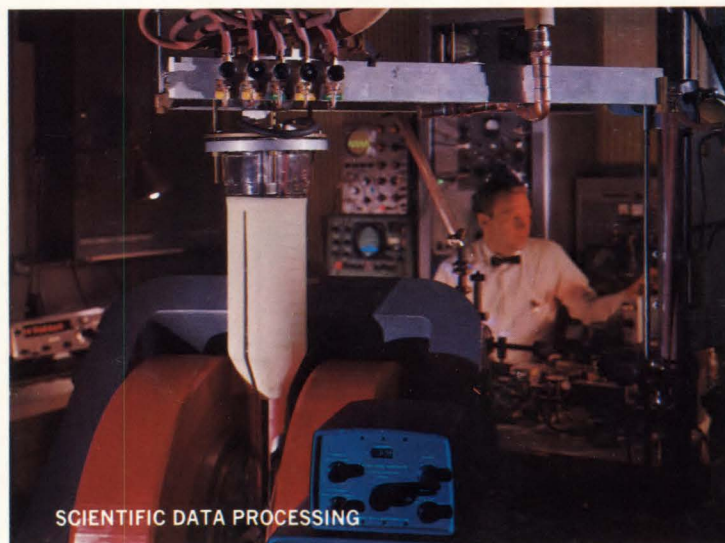
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